

(RE)MAKING BREAD:
INDUSTRIAL TECHNOLOGIES
AND THE SKILLS OF
FOOD INDUSTRY WORKERS

A Thesis Submitted to the College of Graduate Studies and
Research in Partial Fulfillment of the Requirements for the Degree
of Master of Arts in the Department of Sociology
University of Saskatchewan

By

Timothy Zagozewski

© Copyright Timothy Zagozewski, April 2008. All Rights Reserved

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a post-graduate degree at the University of Saskatchewan, I agree that the libraries of this university may make it freely available for inspection. I further agree that permission for copying this thesis in any manner, in whole or in part, for scholarly purposes may be granted by the professor who supervised my thesis work, or in his absence, by the head of the department, or the dean of the college in which my work was done. It is understood that any copying, publication, or use of this thesis, or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis.

Requests for permission to copy or make other use of the material in this thesis in whole or part should be addressed to:

Head of the Department of Sociology
University of Saskatchewan
Saskatoon, Saskatchewan, S7N 5A5

ABSTRACT

The global food industry continues to grow through mergers and acquisitions. The consolidation of grocery chains has necessarily led to increasingly large, heavily industrialized food processing firms. These manufacturers rely on large-scale, automated and mechanized production technologies to deliver controlled, consistent, and safe products to retailers. Using Braverman's (1974) deskilling thesis, and Standing's (1992) three-part definition of skill as the basis for investigation, this research explores the effects of technological changes on the skills of food workers and focuses on the baking industry. The primary research site is the in-store bakery of a Co-op grocery store in Saskatoon, Saskatchewan. Observation took place over a two-week period, and semi-structured interviews were conducted with the bakers in the facility. Other research sites included two large-scale industrial bakeries in western Canada and a flour milling facility in Saskatoon, Saskatchewan. The bread-making processes involved at the research sites are compared, and the impact of the technologies on the skills of workers at each site is discussed. The findings from the research support Braverman's deskilling thesis that bakers in the industrialized food system are experiencing deskilling. This erosion of skills is not only a result of the technological changes, but also, more importantly, the result of the social relations of production. The research also explores Human Resources and Social Development Canada's Essential Skills program. The findings of the research support the argument that the Essential Skills program is a classification scheme that is rooted in scientific management, and can serve to marginalize workers employed in non-knowledge-based occupations. Discussion of the findings also points toward the need to investigate different forms of ownership and their role in preserving the skills and knowledge of workers.

ACKNOWLEDGEMENTS

It is with deep respect and gratitude that I first acknowledge my thesis supervisor Dr. Michael Gertler. His direction, encouragement, and depth of knowledge have all been of invaluable assistance to me. Without his guidance I may never have been able fuse my interests in work and technology with an industry as important as the food industry. Thank you for opening my eyes and mind.

I would also like to extend my thanks to Dr. JoAnn Jaffe, whose continual involvement in this project from day one has been important. Her direction during the field research was beyond helpful. Further, I offer my thanks to Dr. Louise Clarke for her time and insights. Thanks is also due to the members of the “Thought for Food: Essential Skills and Food Systems Performance” research team, who have been very supportive of this work. Also, to the bakers who participated in this project, a most earnest thank you is well deserved. Their co-operation and candidness give this work richness I previously could only have dreamed of.

To my wife Rebecca, I thank you for your endless encouragement, understanding, and support. Words on a page will never allow me to express your importance to me. To Emma, my beautiful daughter, a very special thank-you for giving me perspective on all that is beautiful in life.

The support and camaraderie of my fellow sociology graduate students has been greatly appreciated in completing this project. Finally, I offer my most sincere appreciation to my family and friends for their support throughout this journey.

DEDICATION

I would like to dedicate this thesis to my parents, Barry and Marlene Zagozewski. The completion of this work would not have been possible without their unwavering support and unconditional love. In particular, this work is for my mom, who makes the most delicious brown bread. One day my children will make bread by their own hands; we will teach them together.

TABLE OF CONTENTS

PERMISSION TO USE	i
ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	iv
TABLE OF CONTENTS	v
PREFACE	vii
 1.0 INTRODUCTION	
1.1 A First Taste	1
1.2 Background	2
1.3 Statement of Thesis, Questions and Purpose	3
1.4 Research Design	6
1.5 Methodology	7
1.6 Methods	8
 2.0 THE FOOD INDUSTRY	
2.1 A Brief History of Bread	13
2.2 The International Grocery Market	16
2.3 The Canadian Retail Picture	20
 3.0 PERSPECTIVES ON TECHNOLOGY	
3.1 Theories of Technology and Society	24
3.2 Technology and the Food Industry	38
 4.0 WORK AND SKILLS	
4.1 The Labour Process	44
4.2 Skills and the Deskillings Hypothesis	49
4.3 Essential Skills	61
4.4 Summary of Literature	65
 5.0 OBSERVATIONS AND FINDINGS	
5.1 Introduction	66
5.2 The Work Environments	68
5.2.1 The Co-op Bakery	68
5.2.1.1 The Bakers	75
5.2.1.2 The Managers	77
5.2.2 Industrial Facility A	79
5.2.3 Industrial Facility B	83
5.3 Deskillings Applied	86
5.3.1 Skill as Technique	87
5.3.2 Autonomy in the Workplace	97
5.3.3 Skill as Social Standing	106
5.4 Deskillings: An Uneven Process	108
5.5 Essential Skills and Bakery Work	112

5.6 Summary of Findings	118
6.0 DISCUSSION	
6.1 Overview	120
6.2 Investigating Deskillling: The Interplay of Standing and Braverman	121
6.3 Essential Skills: Scientific Management Revisited	125
6.4 Technology and Agency	127
6.5 The Social Relations of Production	131
6.6 Summary	133
REFERENCES	137

PREFACE

As a middle class Canadian, I am used to starting my day with a good breakfast, eating a well-balanced lunch, and coming home to a hot meal. It took many years of study, reflection, growth, and personal encounters to realize that never worrying about where my next meal might come from was a blessing. In the summers and falls of my childhood, my family would often eat from our garden. Our pantry was stocked with homemade preserves for the winter. On many cold weekends during the Manitoba falls and winters we would eat homemade soups. That soup was always accompanied by the most delicious bread I have ever known, my mother's. For my family, homemade bread was the norm.

My mother once told me a story that I now find especially humorous. After years as a stay-at-home mom, my mother returned to work as a nurse. Her expanded responsibilities did not impact her commitment to sending us to school with a good lunch, but imagine my surprise when I opened my lunch to discover my sour cream and cucumber bunwich (there is no accounting for taste) on a store-bought bun! From that point on it was bought bread on a daily basis; homemade bread became more of a luxury than a staple. In a case of absence making the heart grow fonder, on those weekends that the bread came from our oven, the bread seemed to taste even better.

Now, many years later I again find my life centered around bread. On embarking on my career as a master's student, I envisioned a thesis investigating how technological innovations have altered the work process. It was luck or fate, or both, that led me to study these topics in the context of the food industry. Bread was one of many topics I could have chosen, but the idea of investigating the bread industry resonated within me, and also struck me as being relevant to many people.

1.0 INTRODUCTION

1.1 A FIRST TASTE

Bread is a staple of diets throughout much of the world. Most cultures demonstrate bread-making techniques, whether it is the loaf that most Canadians are familiar with, or some other style of loaf that is baked in an oven or cooked over a fire (e.g. bannock, tortillas, or flat breads). Bread is central to our culture, there is something about it that appeals to people (Eagle, 2002).

Grocers appeal to our basic senses in designing their stores so that the first part of the store we encounter is the bakery. This marketing technique reflects how corporations recognize that food is more than a basic need; it has multiple material and symbolic functions (Lind and Barham, 2004). The manner in which food retailers take advantage of our senses is evidence of how our food culture is being incorporated into the realm of power relationships, both in the production process and in consumption practices. In many ways, this thesis is about power relationships, and how they play out in the workplace and impact food workers. The focus in this case is on bakers working in several commercial and industrial bakeries. This chapter outlines the investigative goals of the thesis, the larger project that fostered development of this research, the research methodology, and the overall design of the study.

1.2 BACKGROUND

This thesis has emerged from work that I have done as a part of the “Thought for Food: Essential Skills and Food Systems Performance” research team.¹ The project was one of several projects funded by the Social Sciences and Humanities Research Council (SSHRC) in co-operation with Human Resources and Social Development Canada (HRSDC) with the purpose of investigating HRSDC’s Essential Skills (ES)² program. What made our approach to Essential Skills distinct was our emphasis on the food system. The project was developed as a multi-disciplinary approach to investigating the applicability of the ES program in various community and commercial food purveying contexts. Members of the research team included Dr. Adrian Blunt, professor of education at the University of Saskatchewan; Dr. Michael Gertler and Dr. JoAnn Jaffe professors of sociology at the University of Saskatchewan and the University of Regina respectively; and Dr. Carol Henry and Dr. Susan Whiting, professors of nutrition at the University of Saskatchewan. Further to the multi-disciplinary academic involvement, the project also involved two very different community partners. The first of these was the Child Hunger and Education Program (CHEP) represented at meetings by Karen Archibald. The second partner was the Saskatoon Co-operative Association.³ Collin Merritt, the general manager of one of the Co-op’s successful grocery retail outlets, represented the Saskatoon Co-op. Other members of the research team included graduate students from the departments and institutions represented by the participating faculty.

¹ The Social Sciences and Humanities Research Council (SSHRC) provided funding for the project. In addition to funding from this project, my endeavors in completing this thesis were also funded by a separate SSHRC Masters Award. The support in both cases is very much appreciated.

² The Essential Skills program will be visited more fully later in the thesis.

³ The Saskatoon Co-operative Association is a member owned consumer cooperative in Saskatoon. Their retail endeavors include grocery stores, gas bars, and home centers that sell building materials and home improvement products.

Because of the varied interests of the project members we were able to conduct several investigations into the Essential Skills program in a food system context. The many projects looked at topics as varied as consumer attitudes toward soy products, the skills of volunteer nutrition coordinators, the process of ES accreditation, food knowledge transfer over multiple generations of mothers and daughters, issues surrounding breast-feeding, consumer knowledge and perceptions of quality, and the skills of food workers – namely bakers. These wide-ranging projects were all grounded in a common theme, and that was to investigate the skills and knowledge engaged at varying points in the production, delivery, and consumption of food.

1.3 STATEMENT OF THESIS, QUESTIONS AND PURPOSE

Few things are as important as the food we eat. Because of this fact, we need to be critically aware of food production methods and food distribution channels. Technologies employed in these two links of the industrial food chain have drastic implications for the diets of citizens, the security of the food system, and the dissemination and preservation of culture. Within the food system itself, the technologies employed by companies have effects on the level of industrial concentration and the organization of work. For all these reasons, it is important to investigate the current state of our food system.

This thesis investigates the effects of technological change with respect to work in the baking industry. A study of the baking industry provides insights into the industrial food system, and the restructuring of work. The food industry is constantly undergoing change, and these transformations can affect both workers and consumers. The consolidation of food companies is having a profound effect on the structure of the food

industry. In the Canadian baking industry alone, the recent acquisition of Maple Leaf Foods' baking operations by Canada Bread has resulted in a company with annual sales beyond \$1 billion (Schofield, 2003). This acquisition was accompanied by a take-over of Ben's Bakery, a prominent bakery chain in Atlantic Canada (Schofield, 2003). The emergence of this processing giant will likely impact the structure of baking operations. Centralized control is expected to lead to more strict "quality" standards, which will be attained through increasing standardization. Despite the demand for high-quality artisanal goods, robotic and computerized control systems are increasingly dominating food processing, as they play a vital role in ensuring accuracy, consistency, and even food safety (Burn, 1998). In addition, automation helps large firms to reduce labour costs (Kohane, 2003).

The implementation of increasingly complex technologies into the workplace can have profound implications on work processes and the organization of work. In *The Corrosion of Character*, Sennett (1998) recalls the differences in a baking facility that he had twice visited in his life. These visits were separated by several decades, and illustrate how technologies have radically altered the workplace. Sennett recollects that during his first visit the baking of bread was:

a balletic exercise which required years of training to get right...the bakers' hands were constantly plunged into flour and water; the men used their noses as well as their eyes to judge when the bread was done. Craft pride was strong...(1998: 65-66)

In his later visit, Sennett notes that the business had shifted from local ownership to being owned by a giant food conglomerate. As a result, the operation had changed drastically. He did not consider it a mass production facility but rather remarked that the bakery was

highly flexible and utilized sophisticated, reconfigurable machines to switch between production of French bread, bagels, and other products depending on local demand (Sennett, 1998). Sennett noted that computerized baking had profoundly changed the balletic physical activities of the shop floor, and that the bakers no longer made physical contact with the materials or loaves of bread. Rather, these processes were monitored via computer screen displays which inform the baker of temperature, consistency, type of bread, and colour of the loaves (Sennett, 1998). Sennett is careful not to romanticize the conditions of the older factory in his assessment. He notes that where in the older facility bakers suffered through extreme heat, pungent yeast odours, oven-related burns, and pulled muscles from primitive dough beaters, the new facility appears cool and relatively user friendly (Sennett, 1998). Passing judgment on these two different work environments is up to the reader, what is important for our purposes is to recognize that new technologies and capitalization of this workplace have fundamentally altered the work performed by bakers.

The Canadian government acknowledges the changes within the food and baking industries as well. Their ambitious Essential Skills program has been developed to categorize the basic skills a worker needs to perform their work satisfactorily. A major function of this program is to develop profiles for specific occupations, which identify the necessary skills for properly doing a given job. Perhaps the clearest indication of change with respect to baking is that the occupation is not one of the hundreds listed in the Essential Skills database. Instead, bakers fall under the broader category of “Process Control and Machine Operators, Food and Beverage Processing.” In part, my research

aims to assess how well the profile put forth by the Canadian government reflects the skills being used in the industry by workers.

Given the importance of food to our physical and cultural existence, it is important to investigate the changing nature of what it means to be a baker in the 21st Century. In part, my thesis question asks if we are facing a situation in which there is significant deskilling occurring, or are we seeing a new class of bakers emerge with new skill sets (Braverman, 1974)? In either of these cases we need to understand how power relationships guide this process. In addition, we need to reflect on the social implications of these changes.

There are three objectives associated with the research. The first is to observe the skills of workers and to assess how skills are changing in the food industry under the influence of technological developments. These observations, in tandem with semi-structured interviews are used to revisit and reevaluate Braverman's deskilling thesis. Second, the research is used to support the development of a more nuanced definition of skill. As will be illustrated later, the concept of skill is far from settled and requires further discussion. This is even more the case as we move forward into the "knowledge-based economy" where concepts of skill and knowledge begin to overlap. Third, the findings are used as the basis for critical reflection on the Essential Skills program.

1.4 RESEARCH DESIGN

As was previously mentioned, this project was one of several conducted within a larger research group. Because of this, the area of study and type of investigation put forth were carefully negotiated. There were many issues to consider in developing the

thesis. First, the study had to consider the ES program, and the findings had to relate back to this government program. The research should foster the ability to understand the work and objectives of the program, to discuss its strengths and its shortcomings, and provide feedback to the program coordinators. Second, any projects developed or proposed by the team members should as much as possible involve the community partners. Third, the design of the research program had to satisfy my own self-interest as a sociologist, while also building on the strengths of my supervisor, committee members, and fellow researchers. Bearing these factors in mind, it was decided, with the aid of my supervisor and the research team, that my research would involve the investigation of bakery workers in a retail co-op. The exploration of this occupation would allow for an inventory of skills to be conducted and compared to the ES program, engage closely with our community partner, and provide a platform for sociological investigation into the roles of technologies in the redesign of work processes.

1.5 METHODOLOGY

To address the multiple objectives noted above, this research project utilizes a qualitative research approach. There are several theoretical and practical reasons for selecting a qualitative research strategy. First, the methods used by qualitative researchers demonstrate a shared belief that a deeper understanding of social phenomena can be garnered than would be possible using solely quantitative methods (Silverman, 2001). The use of qualitative methods allows one to study the many dimensions of social life, including the experiences of everyday life, and (potentially) the actions, perceptions and beliefs of research participants (Mason, 2002). Further, qualitative research can give the

researcher perspective on the meaning and importance of relationships, social processes, and institutions, and how they work (Mason, 2002). Second, and practically speaking, because of the focus on bakers, bakery workers, and managers, the sample for this research project is small. This limited sample does not lend itself to the use of standard quantitative methods.

1.6 METHODS

Investigation into the baking industry requires research at multiple sites in order to understand how the impact of technologies on skills might be context dependent. The use of several different research sites provides evidence useful for contributing to the ongoing debate regarding changes in skills, deskilling, and reskilling. To gain an understanding of the skills required and utilized by bakers, research has taken place in the bakery at a retail grocery store that is part of the Saskatoon Co-operative Association. The Co-op bakery was the primary research site. Investigations at two large-scale industrial baking facilities serve as secondary sites for comparison and to supplement the findings at the Co-op bakery. Permission to study the Co-op bakery was attained via the relationship developed through the “Thought for Food: Essential Skills and Food System Performance” research project.

A two-pronged research approach was employed within the Co-op bakery. First, non-participant observation of the work environment took place. The intent of this observation was to inventory the skills exhibited by food-workers throughout the course of their workday and work week, and to compare these to the skills outlined by the ES program. This also presented an opportunity to observe, document, and analyze the

various types of material technology used in the baking process in a commercial, semi-industrial environment. This phase of the research utilized an ethnographic approach, where the goal was to describe the methods used by employees and to begin to understand their choices with respect to practices that they deploy. Second, I conducted with the personnel working in the baking facility. My purpose with the interviews was to gain an appreciation of how the employees view their roles in the baking/work process. Further, these interviews aided in understanding to what degree these workers are involved in decision-making processes with regard to both management of their own work and future developments (including technology and product choices) in the bakery. Also, I structured the interviews in an attempt to uncover the level of autonomy these workers have in completing their tasks, an important aspect of skill. In addition, the interviews assist in revealing the intentions and goals of these food workers and how they view their future as bakers.

Fortunately, there was also an opportunity to interview managers at the Co-op. The principal purpose of such interviews was to discover more about the decision-making process with respect to technological adoption. I used these interviews to bring a historical context to the study. In the case of long-serving managers, they provide insight into how the bakeries in Co-op grocery stores may have changed over time. My interviews with management also provide perspective on the training methods and programs offered by the Co-op for their bakers. Lastly, the inclusion of managers at the bakery and the store in the study also makes it possible to crosscheck and corroborate worker perspectives on these work processes, technology, and skills and training.

In addition to the study of the in-store bakery, the research has a secondary focus on the supply-chain affecting the Co-op. Broadening the research focus to include the managerial structure of Federated Co-operatives Limited (FCL) allowed for the development of a more in-depth case study.⁴ The project's research partnership with the manager of the retail Co-op afforded the opportunity to conduct an interview with the bakery manager at FCL. FCL is the wholesale co-operative that provides groceries, inputs, technical support, and management advice to "retail" co-operatives such as the Saskatoon Co-operative Association, of which the retail Co-op outlet under study is a part. My intent of this interview was to uncover the rationales used by managers as they make decisions about the technologies to be promoted in retail grocery outlets. Further, through this interview, I sought to gain an understanding of the level of commitment FCL has with respect to the skills of their own employees. This interview provided a window on the processes underlying technological change and the redesign of bakeries and work routines.

The spirit of collaboration runs deep within the co-operative structure, and it was through the manager at FCL that I was able to visit two industrial bakeries in western Canada. The two industrial facilities both serve as suppliers to co-operative retailers in western Canada. At the start of the project, the intention was to follow approximately the same research program in these facilities as the one utilized in the retail Co-op bakery. That is a mixed-methodological approach, including observation and interviews, was proposed for these facilities. In the first instance, observation of the bread-making

⁴ My discussion surrounding Federated Co-operatives Limited pertains to their influence over the bread-making process at the Saskatoon Co-op. Readers looking for a more comprehensive understanding of FCL are encouraged to read *Living the Dream: Membership and Marketing in the Co-operative Retailing System* by Brett Fairbairn (2003).

process in these facilities was undertaken. The scale and characteristics of the technologies being used are compared to the types of technology being used in the in-store bakery at the Co-op. In addition, the tasks being done by workers in this facility are compared to those undertaken by the bakers observed in the Co-op. To complement the observations, it was intended that interviews would be conducted with managers of the facilities. The intent of these interviews was to uncover the motives for the adoption of the technologies already in place, as well as what future changes they anticipate. The initial hypothesis was their decisions might reflect greater concern for control, flexibility, cost, and food safety. Further, the intent of interviews with these managers was to uncover how technological innovations come to be in the facility, that is whether they are the product of in-house research, or adopted from other sources such input-supplying firms or research at academic institutions. The purpose of the research at the industrial bakeries is to cultivate an understanding of the scale of technological advancement in the food industry; and as well to provide some more concrete evidence about the structure of the food industry. However, while the managers of these facilities were genuinely hospitable in allowing site visits/tours, they did not commit to any long-term investigation. Further, tape-recorded interviews with the managers were not agreed to, and the timeframe granted to me did not allow for in-depth discussions.

Academics have argued that the new economy is characterized by decreasing skills for some segments of the workforce, while other sectors are experiencing increasing skills and higher demand. Bearing this in mind a further aspect of the research includes an investigation of the work done by individuals responsible for the production of the bakery mixes used by the Co-op. Here, the proposed research was to include

observations and interviews. However, due to the current circumstances, only an interview with the manager in charge of production was permitted. At the time of the research the facility I had intended to investigate went through a change in ownership. The once locally owned facility was sold to an international concern, which was far less open to the research.⁵ As a result research at the facility was limited to an interview with the milling manager. The interview focused on the technologies used in milling and how they have affected the milling process over time. Using the findings from this interview alongside the findings in the baking facilities enhances our understanding of the scientific thinking, the science, and the commercial logics that underlie the development of new baking technologies.

Because the effects of technological change are context dependent, research at several different sites is helpful. Comparing the findings at the three different research sites reveals more about how technologies are affecting skills and workplace arrangements. Observation and research at the Co-op, their wholesale supplier, and the industrial bakeries, provides some indication of whether or not there is significant deskilling occurring in the food industry, particularly as applied to baking. The interviews with workers and managers at these three sites fostered an understanding of the extent to which issues of control are affecting the skills of workers. These three environments give perspective on the structure of work in the food industry, technological developments in baking, and the impact on the skills of bakers.

⁵ Due to time and funding constraints I was unable to find a suitable replacement facility.

2.0 THE FOOD INDUSTRY

2.1 A BRIEF HISTORY OF BREAD

Bread is central to the diets of many people worldwide. Wheat has been found in archaeological sites that date back 8,000 years; the earliest known milling stone is 7,500 years old; and British museums display Egyptian loaves that are 5,000 years old.⁶ It is suspected that most early hunting and gathering tribes would simply chew their cereals, but people soon discovered that by using stones to pulverize the grain, they were able to create a paste that would harden when set over fire and keep for several days.⁷ This procedure yielded the most primitive form of flat bread. Leavened bread was most likely developed by accident, when the crushed grain was accidentally exposed to bacterial yeast cultures. It was not until approximately 1,000 BC that Egyptians were able to isolate yeast and add it directly to their breads.⁸

In early Mediterranean societies baking emerged as a trade (McCance & Widdowson, 1956). The skill set of bakers at the time also including the milling of grains. Gradually, as the demand for breads increased, the responsibility of milling was removed from the bakery and became a separate enterprise. Larger milling operations were developed, moving away from manual production to the use of large stones powered by wind or water (McCance & Widdowson, 1956). As use of these new technologies emerged, millers, at the behest of bakers, began to produce white flour for fancy baking. White flour was more expensive and its use became a sign of wealth and position, a perspective that runs counter to modern impressions of white bread. Wholemeal breads in the 1600s came to symbolize simpler times and more rustic diets. The cultural statuses

⁶ <http://www.botham.co.uk/bread/history1.htm>

⁷ <http://www.breadinfo.com/history.shtml>

⁸ <http://www.breadinfo.com/history.shtml>

associated with white bread made from wheat (high social standing) and brown breads typically made from rye and barley (low social standing) continued throughout medieval times, through to the early 1700s in England. Many doctors near the end of this time frame still considered white bread to be more nutritious (McCance & Widdowson, 1956).

Bread production remained the domain of the local baker into and throughout the Industrial Revolution (McCance & Widdowson, 1956). Most people during this time still shopped for their bread at small bakeries embedded in the community. The only other source for bread during this time was the home. While the scale of bread production facilities grew throughout the 20th century, it was not until the development of the Chorleywood Bread Process in the early 1960s that baking was radically altered (Cauvain & Young, 2006). Bread, particularly leavened bread, requires a period of fermentation to allow the yeast to interact with the sugars. This interaction results in the release of carbon dioxide, which gets trapped in the dough and causes the dough to rise. This process typically takes several hours, and the longer the bread ferments the more rich the flavour becomes. For example, most sour dough breads are made from a blend of fresh dough and dough left over from the previous day's work; the sour taste is a result of the extended fermentation period.

The Chorleywood Bread Process, developed by the British Baking Industries Research Association (BBIRA), was in part a reaction on the part of millers in the United Kingdom who were seeking to protect their market share. The Weston Company of Britain had taken to importing wheat from Canada because of its superior qualities for making bread (Cauvain & Young, 2006). Canadian wheat worked well with the continuous mixers manufactured in North America and imported into Britain. In contrast,

wheat from the United Kingdom worked poorly in the North American machinery resulting in bread with a weak structure (Cauvain & Young, 2006). However, the North American technologies still relied on long fermentation processes, typically two to three hours. Reducing the time to produce a loaf became the focus of the BBIRA, along with making it possible to develop quality bread using UK wheat. The research team found that they were able to produce a loaf equal in quality by using high-powered mixers operating at higher speeds. The higher speeds would aid in triggering the interaction between the sugars and yeast, producing dough that would rise in a fraction of the time (Cauvain & Young, 2006). The use of these high-speed mixers is what is now known as the Chorleywood Bread Process.

This experimentation led to other developments that would aid in expediting the bread making process. The advent of the Chorleywood Bread Process led to the increased inclusion of improvers, the most widely used of these being ascorbic acid (Cauvain & Young, 2006). These developments have benefited the companies that develop improvers, as their research has led to the greater use of non-traditional ingredients such as enzymes, which also accelerate the fermentation process. In North America, where the Chorleywood Bread Process is not the dominant bread production method, the technological development has still had a major impact. The conditioners and additives associated with the method have become increasingly common in bread making processes.

The Chorleywood Bread Process is now used to produce approximately 80 percent of the world's commercially produced bread (Cauvain & Young, 2006). The scale of the Chorleywood Bread Process has also resulted in a concentration of bread

manufacturing. The size of the equipment, which has increased over time, requires immense amounts of capital. These factors, along with market pressures surrounding the consolidation and growth of retail grocers, are contributing to the concentration of the bread sector (Lawrence, 2004). In Canada, two firms, Weston's and Canada Bread, dominate the industry. Classified as wholesale bakeries by Agriculture and Agri-Food Canada, these companies account for 81 percent of the wholesale bread market⁹. Canadian wholesale bakeries shipped \$2.3 billion of products in 1997.¹⁰

In Britain, two thirds of all commercially manufactured bread is produced by two firms, British Bakeries and Allied Bakeries (Lawrence, 2004). The industry is also seeing rapid globalization, as Canada Bread has recently acquired Harvestime, a bread company located in the UK.¹¹ As a result of these changes, the vast majority of breads that consumers see on supermarket shelves are made at a handful of factories using variations on one industrial method (Lawrence, 2004). As Felicity Lawrence remarks, “perhaps we instinctively know this, (w)e spend on average less than one minute in the bread aisle when we shop” (2004: 104).

2.2 THE INTERNATIONAL GROCERY MARKET

Understanding the changes happening in the bakery industry requires an understanding of the retail food sector. Changes in retail structure have profound impacts on the type of products demanded and the methods by which food is produced. Between 1999 and 2000, food sales in Europe grew an estimated 5.4 percent from € 730.7 billion to € 796.6 billion (Perkins, 2001). The four big markets of France, the United Kingdom,

⁹ Alberta Government -

¹⁰ Agriculture and Agri-Food Canada

¹¹ bakeryandsnacks.com

Germany and Italy represented 64.5 percent of sales in the year 2000 (Perkins, 2001). However, sales in these countries have been stagnant, with either little growth, or in the case of Germany a decline in sales. In contrast, several other countries are emerging as fast-growing markets. In the period between 1995 and 1999, Hungary and Poland demonstrated the most substantial growth at 102.2 percent and 90.2 percent respectively (Perkins, 2001). These countries were followed by the Czech Republic, Portugal, Ireland, and Greece, all of which exhibited five-year growth rates between 31 percent and 42 percent (Perkins, 2001). Within these national markets, there is a distinct amount of variation with respect to market concentration. Typically, the more established markets exhibit higher levels of concentration, while the emerging markets are more diffuse. For example, the most concentrated market is Norway, where the top five grocers capture as much as 98.3 percent of food retail sales. This figure can be contrasted with Poland, where the comparable figure measures at only 10.6 percent (Perkins, 2001). However, even in countries where the food sector is considered less mature, development of hypermarkets (big box retail outlets combining a department store and supermarket) on the part of trans-national corporations is moving ahead rapidly (Perkins, 2001).

The European grocery market has been bustling with mergers, expansions, and strategic alliances. In 2000, French retailer Carrefour solidified its position as the number one grocer in Europe when it merged with Promodès (Higgins, 2001). The move, at the time, also gave Carrefour the distinction of being the world's leading global retailer in terms of global reach. In particular, the merger strengthened Carrefour's position in Latin America where the merged entity became the number one supermarket retailer in Brazil and Argentina (Hendrickson et al., 2001). Despite Carrefour's growth through mergers,

Wal-Mart, because of its strong United States base, retained their position as the world's leading retailer with respect to sales (Higgins, 2001). The Carrefour-Promodès merger has resulted in European sales of € 53.8 billion in 2000, which represents a 6.8 percent market share (Perkins, 2001). The merger was not the only action taken by Carrefour in 2000. Three separate acquisitions in Italy, Belgium, and Greece increased their number of retail outlets by 1,594, representing sales of € 10.6 billion (Perkins, 2001). Within the European market, Carrefour's closest competitor is Tesco, whose European sales stood at € 35.6 billion, a 4.5 percent share of the market. The continuing process of mergers and expansion have likely resulted in further market share growth for these two firms, as well as a select few others.

With respect to competition between Tesco and Carrefour, looking solely at the European market does not present the full picture of the reach of these two food retail giants. These European retailers are developing genuinely global operations. Both of the aforementioned companies have plans to enter the Japanese and Chinese markets, or have already done so (Higgins, 2001). A major player amongst European grocers, Delhaize, has recently consolidated its European and American operations (Perkins, 2001). Another significant global player in the grocery market is European-based Ahold. Recent acquisitions in Scandinavia and Spain, and a planned entry into the United Kingdom, have bolstered Ahold's European presence (Perkins, 2001). What separates Ahold from its European counterparts though is the presence of the company in the Americas. Not only have they established themselves in Central America through acquiring La Fragua, but they are also a major player in the United States (Higgins, 2001). The bulk of Ahold's retail sales are in fact generated in the United States where they are the number three

player in the market (Perkins, 2001). While the strength of these retailers is formidable, it is interesting to note that a merger between either two of Ahold, Tesco, and Carrefour would only close the gap between them and Wal-Mart (Perkins, 2001).

The United States food market in 1998 was worth approximately \$920 billion, of which 80 per cent of sales were through traditional supermarkets and food stores (Kaufman, 2000). Throughout the 1990s, there were significant changes in market concentration. Between 1992 and 1999 the leading grocer was Kroger. In 1992 their sales were \$22.1 billion representing a 7.7 percent market share, numbers that had increased to \$45.4 billion and 12.5 percent by 1999 (Wrigley, 2001). By 1999, however, other retailers had made a move on their position. Most notably, at that time Albertson's, the second largest retailer, had more than tripled their sales and market share to \$37.6 billion and 10.3 percent respectively (Wrigley, 2001). In addition to Alberston's gains, several new retailers emerged in the top six American supermarket chains. As mentioned earlier, Ahold established their American presence during the 1990s. As of 1999, Ahold USA sales totaled \$20.3 billion for a 5.6 percent market share (Wrigley, 2001). Delhaize America rounded out the top six with total sales of \$14.4 billion for a 4.0 percent market share (Wrigley, 2001).

The most significant change in American grocery retailing, however, has been the entrance of Wal-Mart. In 1992, they were absent from the list of the top six food retailers, but by 1999 they were the number five retailer with sales of \$19.8 billion and a 5.5 percent market share (Wrigley, 2001). Even more startling is that by 2004 Wal-Mart had increased their share of United States grocery sales to 19 percent, with that share expected to increase to 35 percent by 2008 (Turock and Rogers, 2005). To give some

additional perspective on these figures, at the end of 2004 there was a Wal-Mart Supercenter¹² for every 200,000 residents of the United States. With planned openings, by 2008 the ratio is expected to decline to one store for every 114,000 Americans (Turock and Rogers, 2005). Each of these retail outlets generates approximately \$780,000 weekly on food sales alone (Turock and Rogers, 2005).

2.3 THE CANADIAN RETAIL PICTURE

In order to understand how the context of baking may be changing, it is important to understand the structure of the food marketplace. In the 2004 fiscal year, Canada's retail food industry recorded sales growth of 3.5 percent, with grocery sales totaling \$67.9 billion (Tutunjian, 2005). Corporate-owned supermarkets and convenience stores accounted for 60.7 percent of this market (Tutunjian, 2005). Corporate retail chains increased their market presence through new openings, adding over 100 outlets (1,887 stores in 2004 as opposed to 1,785 stores in 2003) (Tutunjian, 2005). The increasing presence of corporate chains has continued to have an impact on independent retailers. Unaffiliated independents lost 256 outlets (dropping from 9,521 stores to 9,265), and saw their market share decrease to 4.6 percent from 4.9 percent, with \$3.1 billion in sales (Tutunjian, 2005). Voluntary group stores, or affiliated independents, saw their market share remain unchanged at 34.7 percent, with sales of \$23.6 billion dollars (Tutunjian, 2005).

Within Canada, Loblaw remains the dominant grocery chain with an estimated 18 percent market share. Wal-Mart is a distant second with 7.7 percent of the market (Love, 2004). However, growth in grocery retail does not favour traditional grocery retailers. In

¹² Wal-Mart Supercenters are only one of the types of retail outlets utilized by Wal-Mart in selling food.

addition to Wal-Mart, mounting market pressures are coming from other discount food retailers such as Price Choppers and No Frills, as well as alternative shopping formats such as Costco (Love, 2004; Turock and Fitzgerald, 2004). In addition, the move of non-traditional mass merchandise retailers into the grocery market is affecting the market. Shoppers Drug Mart's inclusion of groceries along with sales of their traditional products has been very successful, as they, along with Wal-Mart, are the only grocery suppliers whose sales are growing (Love, 2004).

As a relatively mature and slow-growth industry in terms of overall sales, food retailers have been driven to expansion, increasing both the size and number of stores, in their attempts to gain market share (Kaufman, 2000). The expansion drive is founded on the rationale that increased size leads to greater economies of scale (Kaufman, 2000). In particular, the increased size of the retailer allows for the opportunity or potential to purchase goods and equipment at a lower cost. "Retailers believe that they can decrease costs through supply-chain management practices—coordinated activities that generate operating, procurement, marketing, and distribution efficiencies" (Kaufman, 2000: 19). In addition, transnational food retailers often seek to centralize management and control at corporate headquarters (Kaufman, 2000). This move is frequently associated with standardization of in-store activities to create a brand identity and maximize retail shelf-space, as store brands offer better profit margins. Large retailers typically employ information technologies to monitor store sales and volumes, so as to better coordinate their distribution. The availability of timely, accurate, and detailed information at head-offices allows for effective control of operations over large geographic areas (Kaufman,

2000). The consolidation of retail grocers also allows for greater market efficiencies in purchasing products from suppliers (Kaufman, 2000).

The consolidation of national and transnational retailers combined with the push towards developing their own private label, national store brands, has led to a situation where national retailers are challenging the market power of large grocery products manufacturing and processing firms (Hendrickson et al., 2001). Hendrickson et al. (2001) illustrate the implications of national branding through a case study of the American dairy industry. Establishing a national brand requires huge supplies of product, provided to a uniform standard. Local and regional processors cannot meet these product demands. This situation has led some retailers to integrate their grocery operations vertically by developing their own processing facilities (Hendrickson et al. 2001). Large retailers continually exhibit support for the dominant economic ideology of the large agribusiness firms and of agricultural economists who argue that increased size and market-share constitute a natural evolution (Hendrickson et al., 2001). The changes that result from horizontal and vertical integration tend to shut out small-scale processors and producers. Retailers have found themselves in a new position within the power relations of the food economy. Where in the past the fragmented nature of the industry led to relative balance between retailers, processors, and producers, the consolidation of grocers has given them the ability to dictate terms to food manufacturers. In turn, this has resulted in a processing industry that serves, first and foremost, the interests of food retailers rather than the interests of farmers, workers, or consumers (Hendrickson et al., 2001).

The implications of consolidation and expansion in the food industry necessitate a discussion of globalization. Globalization can be a rather broad, nebulous concept that

incorporates economics, politics, culture, and knowledge components (Coleman, 2004). Further, changes in these components have elements of extensity (degree of geographical reach), intensity (changes in magnitude), and velocity (the speed of changes) (Coleman, 2004). In a food context, Friedland defines globalization as “the process by which... commodities move into longer and more complex chains” (2004: 5). This appears to equate globalization with global sourcing and truly multi-national, corporate controlled networks for the procurement, transformation, and marketing of particular agri-food commodities. Consolidation of the food system at production, manufacturing, wholesale and retail levels has a direct effect on food sector workers through the development and adoption of new production technologies. The focus of this study is to investigate the changing structure of work in an increasingly concentrated and vertically coordinated/integrated industry. In particular, this project focuses on the work performed by individuals involved in the baking process, and the skills required by those workers.

3.0 PERSPECTIVES ON TECHNOLOGY

3.1 THEORIES OF TECHNOLOGY AND SOCIETY

While this study focuses in part on the effects of new technologies in the workplace, it is important to understand technology from a broader perspective. Advanced technologies have radically altered our existence by changing how we interact with the environment, how we relate to others, and how we reflect upon our own existence. In his well-received book *Technopoly*, Neil Postman argues that technologies now permeate our existence:

New technologies alter the structure of our interests: the things we think about. They alter the character of our symbols: the things we think with. And they alter the nature of community: the arena in which thoughts develop. (1992: 20)

Postman hypothesizes that with respect to technology, there have been three kinds of cultures: tool-using cultures, technocracies, and technopolies (1992). Tool-using cultures represent situations where tools are used to solve specific and urgent problems of physical life but tools do not intrude on the beliefs of the groups (Postman, 1992). In other words, tools are integrated into the culture in a manner that does not disrupt or contradict the worldview of the people. Technocracy reflects a culture where tools come to play a more central role in the thought world (Postman, 1992). According to Postman, it is technocracy that gives us the idea of progress and necessarily loosens our bonds with tradition, whether spiritual or political (1992). In effect, as culture adopts a technocratic demeanour, various traditions are subordinated but not completely displaced. Postman attributes this development to the fact that during the reign of technocracy, industrialism was still too new a concept; people were accepting of the benefits the new worldview offered but reluctant to wholly relinquish past traditions.

Postman argues that a technopoly is essentially a totalitarian technocracy, which makes previous thought-worlds invisible (1992). To clarify, he does not argue that the development of a technopoly makes other ways of knowing illegal, immoral, or unpopular; rather a technopoly makes them irrelevant by redefining what we mean by religion, art, family, politics, history, truth, privacy, and intelligence, so that our definitions fit the requirements of an advanced technological society (Postman, 1992). Relating his own taxonomy with Taylorism, Postman (1992) proposes that even though his name and the specifics of his system are not as prominent, his ideas remain the scaffolding of the present-day American Technopoly.

The work of Frederick Taylor in the early 20th century is often referred to as scientific management, and is a set of production methods, tools and organizational systems designed and implemented to increase the efficiency of factory production; a rationalization of the labour process (Krahn & Lowe, 2002). Elements of this rationalization include the shift of decision-making responsibility and control from workers to management; the use of scientific methods to determine the most efficient way of performing a job; providing the workers with a detailed description of how to perform each step; and close monitoring of the workers' performance (Krahn & Lowe, 2002). Taylor's approach to the labour process revolves around the principles of reducing worker autonomy, reducing their skills, and separating workers from the product of their labour by minimizing their individual input into the end product. The removal of workers from the decision-making process increases workplace hierarchies that contribute to class divisions and power conflicts.

Whether or not we have actually reached a state of technopoly, Postman's work highlights some of the core debates surrounding modern life. In the first instance, Postman suggests that, for the most part, we have come to believe in the supreme authority of science (1992). With respect to the flow of information, technopolies are characterized by the legitimacy of 'experts' (Postman, 1992). Not only have we come to rely on expert opinion in technical systems but also in our everyday lives; with respect to such topics as raising children, making friends, and how to make love, as well as how to make a meal or a decent loaf of bread. As our reliance on scientific ways of knowing and expert knowledge increases, we find ourselves making only practical decisions, not moral ones (Postman, 1992). In effect, a state of technopoly can "(subordinate) the claims of our nature, our biology, our emotions, our spirituality" (Postman, 1992: 111).

As this paradigm permeates our culture, it is not hard to see how its doctrines and decision-making structures can have an impact on the organization of occupations. In the dominant economic system, the provision of rewarding work experiences for all individuals is difficult to achieve as the abstract value of money supersedes the value of a satisfying life for everyone. Because factories are organized in a way that views workers as isolatable and interchangeable parts, industry generates deep alienation and bitterness amongst workers (Postman, 1992). Technopoly fosters an environment that depends on our belief that we are at our best when we act like machines which promotes a loss of confidence in human judgment and subjectivity. "We have devalued the singular human capacity to see things whole in all their psychic, emotional and moral dimensions, and we have replaced this with faith in the powers of technical calculation" (Postman, 1992: 118). Postman summarizes his concerns by arguing that technopoly emphasizes progress

without limits, rights without responsibilities, and technology without cost (1992).

Further, we must understand that “every technology is a product of a particular economic and political context and carries with it a program, an agenda, and a philosophy that may or may not be life-enhancing and that therefore require scrutiny, criticism, and control” (Postman, 1992: 185).

Whether or not one is willing to fully adopt Postman’s taxonomy, he raises critical issues that need to be addressed. Understanding the role of technologies in the economy is now central to social theory (Wajcman, 2002). Increased automation of production and the intensified use of the computer are revolutionary forces within the economy, and alter the character of employment, as well as other social relationships (Wajcman, 2002).

Some academics argue that technology exists as an external, autonomous force capable of exerting an influence on society (Wajcman, 2002). This view is often termed ‘technological determinism’. A related way of viewing technology is technological realism. This perspective holds that a technological object has inherent properties that act as constraints on the observational accounts of said object (Hutchby, 2001). Some scholars continue to take issue with both of these views. In particular, many feel that being overly deterministic with respect to technology effectively narrows the possibility for democratic engagement with technology (Wajcman, 2002). As with sociological assessments of science, sociologists have come to recognize that a range of social factors have a role in influencing the selection of technical options, such that technology is a socio-technical product, “patterned by the conditions of its creation and use” (Wajcman, 2002: 351). Wajcman’s idea is close to the principle of technological constructivism,

which holds that the reality of objects are an outcome of discursive practices in relation to the technological object (Hutchby, 2001). The concepts of determinism and constructivism are the foundations of a dialectic with respect to sociological studies of technology. With these two poles in place, some researchers have attempted to develop theories that reflect how determinism and constructivism operate either singularly or interact in various ways. However, a problem with this approach is that in most cases the relative importance of the two perspectives is seen to be dependent on the type of technology, and how the user might interact with it.

Consider a basic example, the advent of refrigeration within industrial societies. From a consumer/household perspective, refrigeration has allowed people to adjust their consumption patterns by allowing individuals and families to purchase greater quantities of goods and preserve them easily for a longer period of time. In addition, families are able to package their leftovers to eat over the following days. In these instances, the refrigerator is a modern convenience that can save families and individuals time by reducing shopping trips, as well as through being able to build some stock of prepared meals (not to mention the ability to stock a freezer with local foods or with heavily processed TV dinners). From an industrial perspective, refrigeration has led to the expansion of the international food web. At the most basic level, this technology allows producers to ship perishable produce over longer distances. At a more industrial level, recent developments in bread making, such as frozen loaves to be baked in-store, are allowing some bread companies to expand their market share. These loaves are partially prepared and then flash-frozen for shipping in refrigerated trucks. Developments such as this have also been passed along to consumers who can buy the frozen loaves and take

them home to their own freezers to bake later. From this example we can see that for individuals refrigeration has meant increased convenience, while for corporations it has meant an ability to increase market share and product offerings.

Hutchby's theory of technology is that technologies should be treated as a form of text, which he terms affordances (2001). These affordances take into account the functional nature of a technology while also considering the relations that occur with respect to that technology. In this way, Hutchby claims that technologies can be "understood as artefacts which may be both shaped and shaping of the practices humans use in interaction with, around and through them" (Hutchby, 2001: 444). In some respects, Hutchby draws this perspective from Grint and Woolgar (1995) who suggest that technologies are texts that are written by developers, producers, and marketers and subsequently read by users and consumers (Hutchby, 2001). Effectively, there are wide range of social relationships involved in the development and interpretation of technology. However, the perspective of Grint and Woolgar tends to over-emphasize the role of social actors with respect to technology. By introducing the affordance concept, Hutchby attempts to foreground the fact that technologies have properties that constrain the way they can be written or read (2001). These constraints can take different forms, such as physical constraints resulting from the design of a technology (Hutchby, 2001).

Hutchby notes that there are social norms and conventional rules that impact how a technology might be read or understood (2001). Consider how increased industrialization of the food chain has altered consumption patterns such that shopping by automobile has become a near necessity. Industrialized production and processing combined with packaging and advertising/promotions have profoundly altered the way

we shop for food. In many instances, it has become the norm to purchase goods in case-lots. One only has to look at the burgeoning popularity of warehouse retailers such as Costco, Wal-Mart, and Superstore, to see that social norms and economic incentives push us toward the purchase and consumption of goods in large quantities to achieve savings. Packaging and price-conscious consumers contribute to an environment where grocery shopping is best done by automobile. Pulling up to the supermarket in a car is a social norm. Bicycling to the grocery store makes little sense given normal, or socially accepted, patterns of consumption, patterns of urban settlement, and the location decisions of retailers.

Hutchby's work has not escaped critique. In clarifying Hutchby's position, Rappert asserts that affordances are the perceived properties of an object that suggest, but do not necessarily determine, how that technological object might be used (2003). Further, this is not a completely novel approach to the study of technology. Since the 1990s, self-identified social constructivists have sought to move away from grand theorizing about technology and instead focus on the ways in which actors actively make sense of, and contribute to, the development of technologies (Rappert, 2003). Many sociologists before Hutchby have sought to find a middle ground between technological determinism and constructivism. Indeed, most of the constructivist literature has understood technology as configured by and configuring, affected by and affecting, shaped by and shaping society (Rappert, 2003). Rappert further argues that the technology as a text metaphor is misplaced and misleading. He suggests that Hutchby's affordance perspective, drawing on the notion of technology as a text, does not offer much help with respect to elaborating on the social implications of technology, or the

inter-relatedness of the technological and the social (Rappert, 2003). The issue in this regard is that by emphasizing the affordances of a specific technology, it becomes less possible to develop a more robust theory of the social implications of technology.

While many sociologists continue to stress the importance of the human actor in science and technology studies, others focus more on the importance of the material technologies themselves. Pickering (1993) indicates that current critiques of science and technology studies reflect an increasingly widespread conviction that analysis should approach a decentering of the human subject, a post-humanist investigation (1993). In addition, Pickering advocates that we should attempt to understand scientific practice in its temporal unfolding, or its context (1993). These two perspectives point toward the development of a sociology of science and technology that considers, to some extent, that there are nonhuman actors or agents to account for when discussing technology. Or in other words, according to Pickering (1993) science and technology are contexts in which human agents do not make all the decisions; a material agency exists such that technological objects have an ability to affect the social world. Pickering states, “technology...can be seen as a realm of instruments, devices, machines, and substances that act, perform, and do things in the material world” (1993: 563).

The effects of these objects on the material world in turn have an impact on how we relate to the material world and the others we share it with. In a Prairie context, consider the tractor and combine. The impacts that these technologies had on farming were not limited to how fieldwork was done. They also altered social, economic, and demographic characteristics of agricultural communities. The introduction of these technologies effectively meant that fewer people could farm larger tracts of land. Those

taking advantage of these technological advances were able to out compete their neighbors, thus driving them to urban environments to seek employment.

Pickering is careful not to place material agency in the same class as human agency. Human actors differ from material actors because our actions have intent whereas technologies do not (Pickering, 1993). In an attempt to formulate a middle ground between determinism and constructivism, Pickering argues that material and human agencies are “mutually and emergently productive of one another” (1993: 567). The relationship between humans and technologies should be framed in a context of resistance and accommodation. Pickering (1993) speaks of the dialectic of resistance and accommodation as the “mangle”. Within the mangle, material agency emerges in part because technologies are never perfectly tuned; they are typically flawed despite the best intentions of the creator (Pickering, 1993). Resistance represents the intersection of material and human agency, and it is at this juncture where human actors must accommodate the technology (Pickering, 1993). The mangle is a continuous process. We are always making sense of and responding to technologies. In some cases we might opt to improve technologies and in other instances we might decide that it is best to leave the technology behind us. While Pickering’s view does not constitute a new perspective on technology and our relationship with it, it does present an alternative approach to framing the dialectic.

An example from another part of the food industry helps to illustrate Pickering’s perspective. In a study done in the early 1990s, Joel Novek investigated differences between two meatpacking facilities. Novek notes that the meatpacking industry in North America has long been characterized by mass production methods, utilizing specialized

machinery and semi-skilled labour (1992). In the older of the two plants in the study, animals were slaughtered in a multi-level facility: the killing and first cuts were done on the top floor, and subsequent butchering would occur on the lower levels. This setup effectively meant that gravity feed chutes could be used to transfer the product to the next level. In addition, the old plant exhibited less specialized labour compared to the newer facility; that is workers were generally responsible for more types of cuts (Novek, 1992). The newer facility was a single story operation, which relied more on conveyors to transfer product from station to station. Workers in this facility were also less likely to be required to make multiple cuts; rather they were typically expected to make only one type of cut as the meat passed them on the conveyors (Novek, 1992).

Many experienced workers at the new facility saw this change in the work process as a slight on their abilities. The greater use of conveyors in this facility became a focus for resistance for workers, many whom were not comfortable with aspects of this new arrangement. Unfortunately, accommodation was difficult to achieve given the nature of the industry, which was hard-pressed to regain acceptable levels of profitability given intensified competition. Workers attempted to control the pace of the line through sabotage and other means. They also exerted pressure through their union to try to reestablish responsibility for multiple cuts. The factories, however, were designed to minimize the tasks performed by employees and their autonomy. As Novek states, “the new plants enable corporate management to strengthen control of the labour process, to step up the pace of output” (1992: 27). Eventually, experienced and skilled workers either quit, retired, or were laid off, and were replaced by younger and relatively unskilled workers, who were hired at significantly lower rates of pay (Novek, 1992). This example

demonstrates the resistance, although unsuccessful, that may occur when technology and people intersect. However, in some regards, it also reveals the basic limitation of Pickering's theory, in that the resistance in this example has an added human relations component. In this meat-packing example, the implementation and control of the conveyor lines were management prerogatives. With this example in mind, I turn to the role of technology in organizations.

Within both sociology and management literature, there is another body of work that investigates the impacts of technologies in the workplace. In focusing on the application of technologies in the workplace, researchers are able to add more concrete evidence to their arguments regarding the role of technologies and how they reflect power relationships. The ability to observe how certain actors within organizations react to change allows us to understand the impacts of technologies on the workers. In addition, these studies demonstrate how technologies alter the social relations of production.

Sociologists regard technology as an extension of science, whereas technology for organizational researchers is commonly defined more narrowly as any process that transforms inputs into outputs. This is seen as consisting of three major phases: input, conversion, and output (Rousseau, 1979). Rousseau's work raises several issues that should be considered when investigating the technological processes used by a firm. First, Rousseau argues that while input and output activities are distinct, they can be understood based on their characteristics and control function (1979). Input characteristics are the attributes of the materials used, as well as the people involved in the organization, while output characteristics are the attributes of the output following

conversion (Rousseau, 1979). Input control refers to the functions that influence the availability and distribution of inputs in preparation for conversion (Rousseau, 1979). Output control represents those mechanisms that influence the quantity or quality of output released to the environment, for example quality control procedures. It is the conversion process that should be the main focus for sociologists who wish to investigate technology from a skills perspective.

The conversion process adds value to the inputs through the abilities and capacities of both human operators and equipment (Rousseau, 1979). Rousseau argues that the conversion process cannot be fully understood without taking the environment, within which the process is taking place, into consideration. Rousseau believes that “technology in organizations is greatly influenced by the environment, particularly through its influence on input and output activities and on the types of technology adopted by the organizations” (1979: 533). To return to our meatpacking example, consider how the more extensive adoption of the conveyor technology in the newer plant in Novek’s study was mostly a managerial reaction to a changing labour market environment and the need to ensure profitability.

The influence of organizational peers on other firms, and of other environmental pressures, should not be underestimated. Schilling notes that “where an entrenched dominant standard exists, or where an industry is in the process of selecting a dominant standard, firms may be at risk of being locked out of the market” (1998: 267). Lockout can occur in at least two ways. In the first case a firm may find themselves producing a product where there is no dominant design, and subsequently their product may be rejected because the market shifts toward a dominant design unlike their product

(Schilling, 1998). Second, a firm might find themselves locked out because they are unable to produce or sell products conforming to the standard (Schilling, 1998). Firms that are vertically integrated, or possess strategic alliances with producers and distributors, may have a considerable advantage in establishing, or adjusting to, a dominant technology. If a firm has power in this regard, it may have a significant impact on what technologies are adopted, and in what time frame, thus gaining an important market advantage (Schilling, 1998). Because of these power relations among firms, companies may find themselves in a position where they are forced to adopt technologies that have drastic impacts on their workforce in terms of size and skill levels. As an example, most large players in the food industry rely on automated machinery and semi-skilled labour to achieve large production quantities and reduce costs (van Donk, 2000).

The environments within which businesses and other organizations are operating, make it difficult for workers to retain their skills. The principal actors in the production process are employers and workers, and the interactions and negotiations between them constitute the social relations of production (Gouliquer, 2000). Additionally, labour is the component of the production process that is most flexible, and is subject to the control and manipulation of managers and owners in order to achieve economic goals (Gouliquer, 2000). There are varying perspectives on what flexibility means with respect to employees. Some argue that flexibility can empower employees, providing them with new skills and flattening organizational hierarchies.¹³ On the other hand, the discourse about 'new skills' might only refer to the fact that employees are performing a greater number of deskilled tasks (Gouliquer, 2000). The argument in the second case is that flexibility is achieved on capital's terms, leading to worker insecurity and exploitation,

¹³ Gouliquer draws this perspective from Brodsky (1994).

particularly as new technologies replace the skilled tasks performed by experienced employees (Gouliquer, 2000).

Gouliquer argues that there are two forms of flexibility, internal and external. External flexibility refers to employment adjustments through means of layoffs, contracting-out, flextime, or part-time employment (Gouliquer, 2000). Internal flexibility is exhibited when a firm strives to increase output by improving efficiency and productivity through the reorganization of jobs and the redesign of production processes (Gouliquer, 2000). Technological change is primarily a component of internal flexibility. The impact of technological changes on the production process and labour relations vary from firm to firm due to the type of technology selected, why it is chosen, how it is implemented, and who has control over the process (Gouliquer, 2000). Researchers argue that, because the adoption of new technology is usually a managerial prerogative and initiative, technological change has not been emancipatory or fulfilling for labour but more restraining and dictatory (Gouliquer, 2000).

As firms continue to adopt new technologies, which are increasingly complex, there is growing interest in how technologies relate to control within organizations. A debate has emerged in the literature that is akin to the constructivism/realism dichotomy discussed earlier. There are those who argue that technology determines organizational structure and those believe that control imperatives determine technological choices (Hachen, 1988). In both these cases, there is a question of causal links between technology and control systems (Hachen, 1988). In investigating this relationship, Hachen postulates that the relationship between these two aspects of the organization should not be approached from a causal perspective. Instead he argues that technology

and control should be considered together (Hachen, 1988). He further suggests that not considering these two aspects of the organization in tandem may be problematic from a managerial perspective, as altering one without the other may result in incompatibilities (Hachen, 1988). Other factors affecting the relationship include the skill level of the labour force and whether the control system is premised on monitoring employees for punitive or reward purposes.

3.2 TECHNOLOGY AND THE FOOD INDUSTRY

It is appropriate to return to the discussion of bakers that was visited earlier in Sennett's example. Bread making is a complex industry that is reliant on the work of chemists as much as bakers. In their 2004 study on the effects of surfactant gels on dough characteristics, Azizi and Rao inadvertently demonstrate how technological processes have altered bread making so that it now has little in common with traditional conceptions of baking. The ingredients described in their work include glycerol monostearate, sodium stearoyl-2-lactylate, as well as other chemicals, reagents, and solvents (Azizi & Rao, 2004). Investigation of their samples included measuring the colour of crumbs using a UV-visible spectrophotometer (Azizi & Rao, 2004). Their take on bread making reads like industrial techno-science as opposed to the craft baking described by Sennett when he first visited the bakery. Azizi and Rao employ advanced technologies and computerized sensory equipment, whereas the bakers relied on their physical senses. The conclusion of their study indicates, "generally surfactant gels improved the fairnograph, extensograph, and alveograph dough characteristics of wheat flour" (Azizi & Rao, 2004: 551). These are not terms that would be utilized by a baker;

rather it is the dialogue of an expert scientific community. Also notable is their acknowledgement of the Central Food Technological Research Institute in India, who provided the funding for their research.¹⁴

Concerns about the quality of breads go beyond the ingredients in the loaves themselves. Extensive research is also conducted regarding the packaging used in distribution and sale of their bakery products. In some cases, the motives for better packaging revolves around health and safety, as high moisture bakery products have been implicated in outbreaks of food borne illness (Smith et al., 2004). Baked goods manufacturers are concerned with physical spoilage (staleness), chemical spoilage (rancidity), and microbiological spoilage (bacterial, yeast, and mold spoilage) (Smith et al., 2004). Processors have taken on these challenges by utilizing several novel technologies including UV light treatments, infrared radiation, microwave heating, low dose irradiation, and high-pressure technologies before, during, and after packaging (Smith et al., 2004). Most recently firms have begun to adopt modified atmosphere packaging, where the baked goods are packaged with gases such as ethanol and carbon dioxide to counteract the different types of spoilage (Smith et al., 2004). Modified atmosphere packaging is also known as active packaging, which is defined as “an intelligent or smart system that involves interactions between package or package components and food or internal gas atmosphere and complies with consumer demands for high quality, fresh-like, and safe products” (Ozdemir & Floros, 2004: 185).

One item that should stand out as noteworthy in this definition is the term “fresh-like.” This neologism highlights an important dynamic of the industrial food system.

¹⁴ Stephen Cotgrove (1970) argues that we need to be critically aware of the influence that funding bodies can have on research and the findings that result from the funded work.

Many technological innovations, such as refrigeration discussed earlier, have served to expand the market boundaries of processors and grocery product manufacturers. In addition, automated processing technologies have increased production capacities of many firms further challenging them to expand their geographical reach. Fewer firms with more centralized production in turn means that fresh is no longer an option. The best they can strive for is a “fresh-like” product. This is an example of how supposed technological advances affect our conceptions of food, as well as our consumption practices.

Of course, these kinds of innovations in food technology are not confined to baked goods. Writers for the industry journal *Food Technology* frequently advocate the benefits of new and novel approaches to food handling. As one writer states, “food problems...pose special challenges which food formulators through innovative technologies, ingredients, and new approaches are working to overcome” (Pszczola, 2005: 53). Examples of the perceived problems being addressed include genetic altering of corn to ensure the perfect popping kernel, gene sequencing of cattle to ensure tender beef, removing the proteins in peanuts that cause allergies, use of synthetic ingredients to make ‘healthier’ salad dressings, and engineering better artificial flavours by mimicking human taste receptors in testing facilities (Pszczola, 2005). Another food technology frontier is the use of probiotics, defined as the incorporation of microorganisms directly into foods as a stable culture to improve gastrointestinal physiology and function (Senorans, Ibanez & Cifuentes, 2003). Examples such as these illustrate the increasingly techno-scientific orientation of the food system. The scientific food community reinforces their position by arguing that consumer demands are driving these new

developments (Senorans, Ibanez & Cifuentes, 2003; Ozdemir & Floros, 2004). However, one must ask if these are the true demands of consumers, or are industrial food processors and food scientists/technologists constructively misreading consumers? Given the choice of purchasing ‘fresh-like’ bread or a truly wholesome, freshly baked loaf at approximately the same cost, which would consumers choose?

It is important for industrial food processors to understand the importance of consumer-driven product demand. As suggested by Sijtsema et al. “producers must realize that the food supply chain has to become a food demand chain driven by consumers’ priorities” (2002: 565). Understanding consumers is no easy task though, particularly when considering food. Food has a biological nutritive function; quite simply, we need food to live. However, food can have many additional functions. Food can be a sign of status, exhibit magical properties, be rich in religious symbolism, and is a central part of many social gatherings (Sijtsema et al., 2002). Food processors (in tandem with marketers) strive to create these qualities in their product offerings such as microwave-ready roasts, so that families can recreate the Sunday supper ritual in only minutes. Food processors ignore the fact that the preparation of these foods is equally important to the culture surrounding food. The communicative function of food does not singularly occur during the eating of a meal. Moreover, communication in the kitchen while preparing a meal may be even more important for passing on skills and traditions to younger generations.

Industrial food technologies present many new challenges with respect to food in terms of safety and quality. As Lupien declares, “the development and rapid growth of food processing industries for fruits, vegetables, and animal products in Europe, North

America, and other regions of the world, from the 1880s onward, caused concern about the quality and safety of foods among consumers and legislators” (2005: 120). Areas of concern included the use of food additives, food colours, agricultural chemicals, and growth hormones for livestock (Lupien, 2005). The development of appropriate responses with respect to safety issues continues to be at the forefront of much of the discussion surrounding food. Many industry actors believe that the solutions to food security issues lie in the increased application of expert/scientific knowledge and skills, so that problems can be avoided (Lupien, 2005). Gareau (2004) argues that a lack of appropriate technology can contribute to food insecurity, and policy formation needs to address the need for suitable standards of production.

Given the capital necessary to meet expert-defined standards, policies addressing safety may favour larger processors. For small- and medium-sized enterprises, a lack of money, time, experience, access to information, support, and knowledge, can effectively bar them from complying with new standards, thus forcing them out of the market (Yapp & Fairman, 2006). Increased technical and technological standards favour large, well-funded enterprises and promote a system that may cause as many problems as it claims to solve. For example the conditions in industrial livestock and processing provide an ideal environment for bacterial outbreaks. “Solutions” to these types of problems often entrench and extend the dominant model of commercial and industrial food production, but fail to address the root causes of the problems (which may include the size and type of production). Lupien (2005) argues that controls should be in place to ensure food safety, which requires, at all levels of the food chain, knowledge and skills to prevent a

wide range of food problems. We can take this to include food workers, where it is critical to acquire and retain skills in order to ensure high quality products.

4.0 WORK AND SKILLS

4.1 THE LABOUR PROCESS

Understanding technological changes in the workplace, and their subsequent effects on the skills of workers, requires a deeper understanding of the labour process. Since the publication of Braverman's *Labour and Monopoly Capital*, many social scientists, economists, and academics studying management have focused their attention on understanding and theorizing the labour process. There is general agreement amongst this diverse group of scholars that a labour process is "a means by which objects, peoples, tools, knowledge, and tasks are organized so that they are transformed into different objects or services having some value for others" (Wardell, 1999: 4). However, the open-endedness of this definition encompasses many divergent approaches to labour process theory.

In assessing Braverman's work, it is important to understand that he did not come from an academic background. Before taking on editorial duties at a publishing house, Braverman worked in various skilled metal trades. Because of this employment background, Braverman's book was substantially different from conventional approaches to the sociology of work. Braverman was critical of the established academic approaches, as well as the organization of work and the workplace. Braverman recognized that the organization of the workplace represents a domain of life for an individual that is a key force in the production and reproduction of class inequality (Wardell, 1999). This approach to understanding work was not new. Stanley Udy (1970), for example, had previously noted that work was simultaneously physical and social. Braverman put much more emphasis on implications of the fact that work and workplace are embedded in the

political-economic context of the capitalist employee relationship (Wardell, 1999).

Workers rely on employers for their livelihoods and their choices may be limited, while employers have greater flexibility with respect to whom they hire. The relationship is interdependent, but asymmetrical (Wardell, 1999). In Braverman's view the plight of workers is exacerbated by the emergence of stronger managerial control in the workplace. Drawing on the insights of Karl Marx, Braverman saw capitalist managers, whether owners or hired overseers, as motivated to extract the maximum amount of effort from workers in order to increase profits. Braverman developed this argument with reference to Frederick Taylor's principles of scientific management. Braverman saw this as a process of organizing work such that the conception of the task is separated from the execution, with both knowledge and power thereby transferred to management (Smith, 1994; Wardell, 1999).

Wardell (1999) contends that an oversight of Braverman's work is that the labour process might be problematic for both employers and employees, and that there are varying levels of conflict and co-operation between workers, managers, and owners across various capitalist enterprises. Wardell argues that the labour process is structured within four arenas of control, specific to particular work settings. The four arenas of control are: 1) management; 2) social and technical relations in the workplace; 3) human resources practices; and 4) industrial relations. He further notes that these arenas are social arenas, where efforts are made to control the flow and outcomes of the production process, and where actors express different, potentially conflicting, interests. The management arena refers to the strategies employed by managers to maintain and develop operations, which includes the views held by management regarding the roles and value

of workers. The strategies involved would include Taylorism as an overall philosophy of production management. The arena of social and technical relations encompasses job design, the sequencing and regulating of tasks, type and use of technology, and work arrangements (teams, shift work, contract work). These first two arenas closely fit Braverman's analysis and are frequently the focus of studies investigating the changing skills (deskilling) of workers, as well as studies focused on worker resistance.

The other arenas, human resources and industrial relations, are often cited as areas of investigation that were overlooked by Braverman. The human resources arena refers to the jobs and skills training programs for workers, advancement opportunities, compensation and benefits packages, and safeguards for employee rights (Wardell, 1999). Human resources has less to do with specific shop floor activity and more to do with the overall behaviour of workers and fostering employee commitment with the goal of improving job performance. The industrial relations arena refers to the formal relations between management (who may also be owners) and workers, and how the latter are represented (via employee associations, unions, work councils, and governments that mediate). The absence of these areas of inquiry and analysis in Braverman's work has been cited as a shortcoming. Some commentators see the potential for employee unions to resist the control practices of management as a major force opposing deskilling (Wardell, 1999). Wardell's work in highlighting these four arenas of the labour process has given researchers a more structured framework with which to study the labour process and to understand the roles of different actors when investigating the skills of workers. His writing brings the relations of the people involved in the labour process to the forefront of critical investigation.

Keeping the relationships between actors at the forefront of research on the labour process is important in order to better understand the changes that take place—or are resisted. In an economic world dominated by managers seeking to maximize profits and by consumers obsessed with finding bargains, we often forget about the impact that the quest for “value” has on workers. Sometimes the value of labour gets lost in the valorization of products and services, as labour is reduced to a unidimensional production input (or factor) in the production process. For example, the labour cost of a baker is considered only on a nominal basis, just like the cost for the flour needed to produce a loaf. The capitalist labour process has been defined as a unification of the process of production and the process of valorization (Cohen, 1987).

Valorization in the production process involves something more than assigning value to a product or service, or the maintenance of the price over time. In the labour process, valorization involves producing a product with use-value, exchange-value, and surplus value (Steiger, 1999). Use-value is the particular use a good can be put to, or the need it satisfies for a certain person or group of persons. Exchange value refers to the monetary value of a product or commodity in a cash economy and that value in relation to other goods in the marketplace. Last, surplus value is generated via reduction of the socially necessary labor time required to produce a certain good, product, or commodity. It is the workers who must produce a product whose exchange value surpasses the value not only of their own labour but also the salaries of their managers and other production costs. It is the extraction of this surplus value that Marxist political economists refer to as exploitation (Steiger, 1999).

The concept of valorization is important for the investigation of changes in labour processes and skills. While some scholars argue that there is overall growth in skills at the aggregate level (Penn, 1984), changes in skill level must be understood through the concept of value and its relation to exploitation. Researchers must understand how advanced technological production processes can undermine the value of labour; this includes the surge toward automated production processes.

The devaluation of labour, which can include the decline of real wages, loss of skills, and lower social standing, can be linked to the technological changes we see throughout industries. Over time, there has been a shift to an industrial model where the standardized organization of tasks and the work pace is dictated by technologies (Smith & Thompson, 1999). The adoption of technologies can result in a workplace where workers find their autonomy eroded. Even in workplaces promoting teamwork in the name of worker empowerment, there is limited delegation of authority, the empowerment rhetoric is mostly empty, and managerial prerogatives remain intact (Smith & Thompson, 1999). The individual worker is frequently overlooked in the workplace, and viewed as part of a collective, anonymous input. Braverman and others understand that the workplace is an important arena for the construction of identities (Smith & Thompson, 1999) and that the introduction of technologies can present major challenges to the building of worker identities. However, while frontline workers may experience deskilling, other workers may encounter new and rewarding opportunities.

Some researchers identify increasing levels of polarization between experts and nonexperts (Burris, 1999; Hughes & Lowe, 2000). The polarization thesis proposes that complex changes occur as more advanced technologies are entrenched within workplaces

and become a hallmark of industrial sectors and national economies (Hughes & Lowe, 2000). As organizations introduce complex technological innovations, a gap emerges between managers, technical experts, and professionals (experts), and production workers (nonexperts) (Burris, 1999). For experts, the emphasis on technological solutions can enhance the work experience and call upon higher levels of skill. The work tends to be more creative, flexible and collegial. At the opposite end of the spectrum, nonexperts often experience increased routinization, loss of skill and autonomy, and more stringent surveillance. The simultaneous changes experienced by these two groups of employees have led to a discussion of ‘skill restructuring’, where both deskilling (of nonexperts) and reskilling are occurring (of experts) (Burris, 1999). The result of these workplace shifts over time is that the voice of nonexperts is marginalized, and the knowledge and insight they might bring to problem solving and product development is eradicated. This may also tend to limit the ability of workers to develop any sort of positive identity through their work.

4.2 SKILLS AND THE DESKILLING HYPOTHESIS

As this project is focusing both on the Essential Skills initiative and the potential effects of deskilling on food workers, an important issue to address is how we define skill. The literature is sometimes vague in this regard. While academics often discuss deskilling processes, they infrequently attempt to provide a concrete definition of skills. Skills are often confused with the notion of a job or some ideas about occupation (Standing, 1992). Standing notes that at an abstract level, “skill implies some combination of creative and manual abilities” (1992: 259). Further, skill has at least three

underlying meanings: it reflects objective characteristics of work activity, autonomy in the production process, and also the social status of the work or worker (Standing, 1992). When referring to the objective characteristics, one is looking at skill as technique. Standing argues that a useful way to understand the level of skill associated with a job is to reflect upon whether the worker is a ‘specialist’ or ‘specialized’. In the latter case, the worker may receive general training and perform routinized tasks, and is generally excluded from the design and comprehension of the production process (Standing, 1992). This state of work differs from that of the specialist who is likely to exercise far more discretion over when and how to carry out his/her tasks (Standing, 1992).

This distinction between ‘specialist’ and ‘specialized’ work leads into the second underlying meaning of skill, the autonomy associated with the job. We should understand that a significant issue to address when reflecting upon the deskilling of work is the degree of autonomy enjoyed by the worker. According to Standing, “the skilled are differentiated primarily by the degree to which they have an autonomous status” (1992: 260). Autonomy refers to the freedom that an individual has in deciding how to organize their job tasks and to respond to the demands of managers (Standing, 1992).

The last underlying meaning of skill, social status, offers an interesting perspective on the preservation of occupational prestige. Standing claims that “some occupations are called skilled simply because of custom or because barriers to entry have preserved an artificial or arbitrary skill hierarchy” (1992: 260). Further, he asserts that the preservation of social status may also be safeguarded through a ritual of training that has little relation to the complexity of the task or to the general and specific knowledge required (Standing, 1992). Skill as social status is also closely linked to skill as technique

and the autonomous aspect of skill. Specialist occupations, which require complex skill sets and where the workers exhibit increased levels of autonomy, are often associated with high social standing. Conversely, jobs requiring simpler skill sets and where the work is highly routinized are associated with lower social standing (Standing, 1992).

Perhaps the most important contribution that Standing makes is to develop a distinction between an occupation and a job. According to Standing, an occupation is characterized by a “career of learning and the mastery, or possession, of the mysteries of a craft or profession” (1992: 258). In this respect, an occupation presents the worker with a sense of continuity, a progression, and an acquisition of status, control, and autonomy (Standing, 1992). In contrast, “a job” conveys only an activity, a limited and limiting piece of work with a narrow set of tasks (1992). Jobs are characterized by a lack of permanency, accumulated wisdom or skill, and are surrounded by an aura of insecurity (Standing, 1992). The difference between these two forms of work is characterized by Standing in the following manner: “a job is what one does now, an occupation is what one is” (1992: 259).

Standing argues that the opportunity for workers to engage in meaningful occupations is being limited by the adoption of flexible labour/employment regimes. In particular he argues that the shift away from protected, full-time wage employment to less secure forms of labour relations, such as outsourcing, subcontracting, and casualization, results in labour force fragmentation and the erosion of economic entitlements (Standing, 1992). In this environment, training programs are designed in terms of “minimal modules of employable skill”, such that occupational training is

reduced to job training, where trainees have little opportunity to realize autonomy or status (Standing, 1992).

This, in turn, has led to the erosion of “labour process security”. Labour process security refers to the possibility for workers and their representative organizations to participate in, and to influence the development of the labour process. Standing (1992) defines the labour process as working conditions, work structures, skill acquisition, and reformulation of tasks. Overall, Standing’s arguments support the idea that pressures from owners to improve profits and efficiencies by reducing worker autonomy results in the erosion of skills. Flexible specialization, and product and process standardization through the selective applications of new technologies, increases the control of owners while simultaneously reducing the level of skills required by workers.

Revisiting the earlier sections of this literature review, the concentration of grocery retailers, and the development of their own private brands, leads to a need for greater levels of standardization up the food chain. Processors and grocery product manufacturers are forced to consolidate and expand their operations in order to meet the requirements of retailers. Food processors and manufacturers, including those producing baked goods, look to increased mechanization in order to increase output, implement controls, and meet standards (Burn, 1998). Moreover, given the capitalist nature of the market, profit motives and class interests are embedded in the drive to mechanize and automate production. Braverman postulates that changes toward mechanized production “have been brought about by the drive for greater productivity: that is, the effort to find ways to incorporate ever smaller quantities of labour time into ever greater quantities of product” (1974: 170). In this way also, the adoption of new machinery is an effort on the

part of management to wrest control of the work process from workers and to reconstitute it as a process coordinated by management (Braverman, 1974).

The use of machinery to achieve managerial control over the work process has been complemented by the adoption of the principles of scientific management. Frederick Taylor utilized time studies as the core element in gaining control over jobs. Time studies are best defined as “the measurement of elapsed time for each component operation of a work process” (Braverman, 1974: 173). In time, Frank Gilbreth added the concept of motion to the basic study of time in analyzing how workers execute their jobs. Movements were catalogued for comparison to alternative methods in the hopes of developing the optimal means of completing a task. Further, these studies created standardized measures for tasks, in effect describing jobs in purely statistical terms, with little concern for the needs of workers (Braverman, 1974). When Gilbreth combined the concepts of time and motion, he named the new study procedure Therbligs (the near reverse of his surname) (Braverman, 1974). When observing workers under this system of analysis, jobs were broken down into component tasks, including such actions as grasp, sit, bend, assemble, hold, and position. After an observer had analyzed an occupation, a Therblig Chart was generated for the occupation, which represented the separate activities of the worker in any part of the work sequence. After the development of the Therblig chart, additional standardized approaches to examining the work process were developed. Some of these approaches were specific to companies and designed in-house, while others were developed as more industry specific (Braverman, 1974).

At the core of the deskilling thesis is the idea of stripping each task to its simplest components, reducing worker discretion, routinizing the work process, and habituating

the worker (Smith, 1994). Labour itself becomes a singular input in the production process, merely another cost to consider along with building rents, equipment expenditures, marketing activities, administration, and other business functions. In effect, labour is reduced to an accessory to technology and labourers (as well as consumers) are deskilled as an outcome of the struggle for power and control over work processes, labour markets, and other markets (Jaffe & Gertler, 2006). Further, it becomes apparent that the relations between workers and managers (and skills) in the capitalist workplace are driven by issues of class and power. Many of the changes that result in a reduction of status for lower-level employees have little to do with organizational efficiency and modernization, and much more to do with control of the workplace (Smith, 1994). The role of organizational hierarchies in shaping deskilling processes is a key focus of Braverman's work.

Braverman's discussion of skill has been seen as an important contribution for at least three reasons. First, Braverman integrated scattered ideas on skill degradation into a coherent Marxist framework (Form, 1987). Second, by framing deskilling as an evidence-based debate between Marxists and non-Marxists, Braverman opened a necessary channel of debate between the two (Form, 1987). Third, by demonstrating that monopoly capital was using mechanization and automation to deskill blue-collar jobs, Braverman modernized Marxist thought (Form, 1987). Automation can be viewed as the descendant of mechanization, and a more advanced agent for deskilling via the elimination of the worker. Automation enlarges the reserve army of labour through the deskilling of occupations and the elimination of jobs (Form, 1987). Braverman's radical assertions also served to rekindle interest in the effects of technological progress in the workplace.

He reminded us that mechanization, long accepted as beneficial to the masses, can play an authoritarian role in the workplace. Technologies in the workplace are an embedded form of technical control (Simpson, 1985). Managerial initiatives with respect to control involve not only the ability to control the content of work but also the terms under which the work is done (Simpson, 1985). Increased levels of control result in proportional or even greater decreases in worker autonomy.

Braverman's focus on declining skills is often argued to be limited in scope as he tended to overlook some of the new skill sets that are required in industrial and post-industrial economies (Krahn and Lowe, 2002). Critics cite the increased demand for leadership skills, sophisticated people skills, efficient mastery of new technologies, and the ability to operate computers as skills not addressed by Braverman (Krahn and Lowe, 2002). Second, Braverman's work implies that workers passively accept managerial assaults on their job skills and autonomy (Krahn and Lowe, 2002). This criticism ties in with what some argue to be the main shortcoming of *Labour and Monopoly Capital*, namely that Braverman's theory of the degradation of work is overly deterministic and seems to suggest that workers seldom resist the changes proposed or imposed by owners and managers. Other critics have also argued that, despite the length of Braverman's work, his analysis is simplistic in the way it assumes that capitalist interests have the "totalizing power to deskill and degrade work" (Smith, 1994: 407). Critics see the transformation of work processes as a much more complicated dynamic shaped by historical, social, and cultural circumstances.

Krahn and Lowe's (2002) assertion that Braverman failed to account for the resistance of workers has been a key critique of his work. Recognition of this issue has

resulted in the reinsertion of the subject (worker) in labour process theory (Smith & Thompson, 1998). The second wave of labour process theory has reinserted the worker as a social actor in several ways. First, workers are presented as having the ability oppose capital. Second, workers may also serve as a creative resource, which in many instances can successfully convert labour power into profitable labour. Third, workers are also a source of consent, most notably when labour partakes in workplace games or routines (Smith & Thompson, 1998). The reinsertion of the subject into labour process theory is tantamount to the introduction of agency into Braverman's original framework (Smith, 1994). However, the inclusion of the subject does not eliminate the need to investigate the continuing process of deskilling. Even if workers have some ability to resist changes imposed upon them, the capacity to resist is limited by their need to work. Also, while workers may have opportunities to be creative and contribute to the organization, there is a need to understand the degree of that involvement and how it affects the skills of workers.

The sociology of work has found new life in the broader discussion of globalization. In *The McDonaldization of Society*, George Ritzer considers the restructuring of work through a new lens that he refers to as McDonaldization. He argues that the processes used to rationalize and control production in fast-food restaurants are permeating many other workplaces as well as other aspects of society (Ritzer, 2004). As a process, McDonaldization hinges on four dimensions: efficiency, calculability, predictability, and control through nonhuman technology. In a McDonaldized workplace, workers may feel vulnerable as a result of the many organizational and technological processes that serve as instruments of control. Furthermore, the threat of being displaced

by new technologies may be very real. This ensures that managers and owners retain power in the employee-employer relationship (Ritzer, 2004).

According to Ritzer, the McDonaldization of food preparation has significant social and cultural impacts as “the acceleration of technological change, the increasing pace of life—all this and more make it impossible to go back to the world, if it ever existed, of home-cooked meals, traditional restaurant dinners, high-quality foods, meals loaded with surprises, and restaurants run by chefs free to express their creativity” (2004, 18). Like Braverman and many other scholars, Ritzer views Taylorism as the root of efficiency-minded and calculable practices with respect to production. Food production is dominated by a focus on quantity over quality, where it is important to give an illusion of generous quantity (Ritzer, 2004). Food decisions become narrow dollar and cents calculations for producers and consumers. The use of technologies to increase yields and reduce input and production costs becomes the norm. Even food quality becomes a limited quantifiable measure for example, through the use of spectrophotometers to identify bread that is of suitable colour and consistency (Azizi & Rao, 2004).

The relationship between technology and control is central to the McDonaldization argument. For Ritzer, technology includes machines and tools as well as skills, knowledge, rules, regulations, procedures, and techniques. Ritzer (2004) also makes a distinction between human technologies, which are controlled by people, and nonhuman technologies in which the technology controls people. Increasingly, companies, particularly in the food industry, adopt such nonhuman technologies in order to exert control over workers and the production process. That is “control by people has shifted toward control by technologies” with respect to the work process (Ritzer, 2004:

107). In short, Taylorism is manifest in McDonaldization. The food industry is structured such that the tasks performed by workers are more basic and leave them with fewer opportunities to exercise their own judgment and skill (Ritzer, 2004).

Industrial bakeries now incorporate automated systems that leave humans with minimal roles (Ritzer, 2004):

The most advanced bakeries now resemble oil refineries. Flour, water, a score of additives, and huge amounts of yeast, sugar, and water are mixed into a broth that ferments for an hour. More flour is then added, and the dough is extruded into pans, allowed to rise for an hour, and then moved through a tunnel oven. The loaves emerge after eighteen minutes, to be cooled, sliced, and wrapped (Serrin, 1980: 23).¹⁵

When we discuss technology, it is important to understand that there are material and non-material dimensions. The non-material side of technology refers to the knowledge and technical skills involved in producing some product or service. The material dimension of technology refers to the mechanical devices utilized in converting raw materials into a product or service (Shepard, 1977). The ways that technologies are selected and deployed in the workplace has a major impact on the division of labour (Shepard, 1977). Material technologies have effects on the non-material aspects of technology. For workers these impacts are significant with respect to the retention of knowledge and skills.

The examples offered by Ritzer and Sennett that were discussed earlier provide evidence of how the skills required by bakers have changed over the years due to changes in material technologies. They do not, however, address skills employed at another stage of the process where highly skilled individuals develop sophisticated monitoring and control equipment. These developments are representative of a post-industrial society

¹⁵ Serrin as quoted in Ritzer (2004). It is important to acknowledge that this source is now more than 25 years old, which provides an interesting basis for comparison with my own observations.

where “complexification will be the prevailing pattern of social change” with respect to work (Hage & Powers, 1992: 50). As some workers are rewarded for exhibiting new and more complex skills sets, others will see their skill-base eroded, a situation that is characteristic of a post-Fordist economy.

The debate surrounding Fordist and post-Fordist economies continues to inform the sociology of work. While there are several dimensions to a Fordist society, including the regime of accumulation, the mode of regulation, and the mode of societalization, the most important aspect is the type of labour process (Jessop, 1992). The labour process in Fordist regimes is akin to the type of work characterized by Braverman. Such processes are typified by assembly line production and long unbroken production runs to ensure economies of scale (Jessop, 1992). In addition, Fordist production is reliant on Taylorist principles of systematic control by management over the production process and reliance on semiskilled and unskilled labourers (Jessop, 1992). The production regime of Fordist economies then gives rise to the consumption of mass-produced, standardized commodities. In short, Fordism is “the production of standardized goods or services through a Taylorized technical division of labour, the use of dedicated machinery, and a focus on economies of scale” (Jessop, 1992: 54).

A focus on the labour process reveals how post-Fordism differs from Fordism in some ways but in others can be seen to exacerbate concerns regarding the (dis)empowerment of employees. The labour process in a post-Fordist economic environment can be defined as a flexible production process based on adaptable machines or systems, as well as an appropriately flexible work force (Jessop, 1992). The crucial hardwares in a post-Fordist economic environment are microelectronics-based

information and communications technologies (Jessop, 1992). As a result of the application of these technologies in the workplace, it can be argued that in some occupations post-Fordism will lead to a further extension of Taylorism into occupations previously characterized by autonomy and creativity, as well as further intensification of Taylorist principles in occupations already affected by this approach to work (Jessop, 1992). For this reason, Jessop finds it difficult to refer to the present state of economics and production as post-Fordist, and instead argues that if anything we are witnessing the continued advancement of Fordism (1992). However, the introduction of advanced technologies and the need to meet the demands of increasingly capricious consumers requires the work of skilled technicians with increasingly complex skill sets. In effect, the reliance on flexible forms of technology requires a highly skilled but different type of worker. Craft production methods are replaced by new technologies created and maintained by a new class of workers (Jessop, 1992).

Understanding changes emerging in a post-Fordist work environment can further our understanding of deskilling. At the same time, recognition of changes in the division of labour can augment our understanding of control in the workplace. An integral part of post-Fordist theory pertains to flexible specialization and its contribution to the process of deskilling. Coriat (1992) notes that the move toward post-Fordism involves a process-flexibility where new automation techniques make it possible to use facilities at full capacity despite uncertain demands. This is due to a new focus on product flexibility, where economies of scale give way to economies of scope, where firms focus on maximizing market capitalization through offering a diverse product line that reflects the needs of the market (Coriat, 1992).

Coriat's work raises the possibility that a move to a post-Fordist production strategy will have little benefit for front-line workers. In discussing the division of labour, Coriat contends that the shift from the old paradigm to the new is based on the premise that "the maximization of the output does not rely on the performance of the individual worker, but is primarily related to the optimization of operations and processes" (1992: 145). Essentially, Coriat's discussion reasserts the notion that advanced technologies will continue to be deployed on the shop floor and to displace the skills of workers, if not the workers themselves. With respect to control of the labour force, firms attempt to increase their competitive edge by making the wage contract more flexible; that is they attempt to decrease the direct and indirect costs of the labour force by moving towards alternative employment arrangements such as contract work, part-time wages, and outsourcing (Leborgne & Lipietz, 1992). This process has been characterized by some as the casualization of the labour force.

4.3 ESSENTIAL SKILLS

The Canadian government acknowledges that the workplace has been radically altered over the past decades. Corporate structures have been transformed by increased global competition and the continued adoption of material technologies. There is an understanding that jobs, and their specific skill and knowledge requirements, are changing. HRSDC's Essential Skills (ES) program has been developed to classify the skills a worker requires to execute particular jobs satisfactorily. ES was launched in April of 2003, and proposes to "ensure that Canadians have the right skills for changing work

and life demands.”¹⁶ Further, the program is expected to inform people of the skills they need for certain occupations, aid in the development of workplace training programs and job descriptions, and create educational tools to enhance skills development.¹⁷ The occupational profiles and complexity levels identified by HRSDC have also been developed to provide a wide range of information to employers and trainers about the skills which prospective employees are expected to deploy. This information, according to HRSDC, is critical in ensuring that Canadian companies will be able to compete in a globalizing, knowledge-based economy.¹⁸

The nine Essential Skills promoted by HRSDC include reading text, document use, numeracy, writing, oral communication, working with others, continuous learning, thinking skills, and computer use. These skills were identified and validated through extensive research by HRSDC, as well as other national and international agencies.¹⁹ In discussing the ES program it is imperative to recognize that the Essential Skills Research Project (ESRP) examined a number of skills but only selected nine for further study and use in their program. “These nine were selected because they are identifiable, definable, common, (though varying in form between occupations), and are susceptible to influence through relatively short training interventions.”²⁰

The ESRP moves beyond the simple listing of nine skills. This initiative differs from many others like it in that the program recognizes that workers require skills with different levels of complexity for different occupations. The levels of complexity range from 1 for the most basic tasks to a score of 5 for the most complex tasks demanded of a

¹⁶ Essential Skills Website

¹⁷ Essential Skills Website

¹⁸ Essential Skills Website

¹⁹ Essential Skills Website

²⁰ Essential Skills Website

worker.²¹ The several hundred occupations identified and researched in the ES database are categorized and summarized in terms of the skills required and the level of complexity for each.

A major function of this program is to develop profiles for specific occupations by cataloging the skills necessary for a particular job. Even a quick look at ES reveals that the orientation of those responsible for creating the program for food sector workers is dominated by a Tayloristic and McDonaldized ideology. Conceivably skilled occupations such as bakers, butchers, and chefs are notably absent from their seemingly comprehensive list of occupations. Instead, these occupations fall under the broader category of “Process Control and Machine Operators, Food and Beverage Processing.”²²

Defining food workers as “Process Control and Machine Operators” for food and beverage processing signals a disconnect of the human experience from food. Food workers are more frequently called upon to use prescribed protocols as opposed to creativity, or deeper knowledge, in their work. Using baking as an example, we might find that workers in bakeries (as opposed to bakers) will be able to read documents, do basic math, and communicate effectively, but will infrequently encounter situations which call upon any embodied knowledge about bread. The jobs of bakery workers may not necessarily require the knowledge and skills learned and deployed by a home-baker, but more frequently require only limited technical knowledge conforming to capitalist interests and provided by institutional educators (Jaffe and Gertler, 2006).

The following passage summarizes the “occupation” of “Process Control and Machine Operators, Food and Beverage Processing:”

²¹ Essential Skills Website

²² Essential Skills Website

Process control and machine operators in food and beverage processing operate multi-function process control machinery or single function machines to process and package food and beverage products. They are employed in fruit and vegetable processing plants, dairies, flour mills, bakeries, sugar refineries, meat plants, breweries and other food and beverage processing establishments.²³

While the profile assesses the complexity level of each Essential Skill in the profile, at the beginning of the profile HRSDC singles out numeracy, oral communication, and problem solving as the most important Essential Skills for this occupation. With respect to numeracy, the complexity levels range from 1 to 3 and include activities such as measuring and weighing ingredients, measuring the thickness of products to ensure consistency, and estimating the number of necessary containers or the size/length of equipment or hoses. Oral communication is rated as a 1 on the complexity scale, and refers to discussions with coworkers, supervisors, managers and technicians about processes, production levels, and equipment. The complexity level for problem solving typically ranges from levels 1 to 3. The profile cites potential problem solving opportunities such as the need to make adjustments to equipment to ensure a consistent product, rectify issues with bad batches of product, and deal with equipment or computer malfunctions. This brief discussion of the Process Control and Machine Operators, Food and Beverage Processing profile will be elaborated upon later in the thesis (and compared to my observations of various workers). It is introduced here to give the reader some idea about the elements of a typical profile and about the specifics of the profile to which bakers have been assigned.

²³ Essential Skills Website

4.4 SUMMARY OF LITERATURE

The consolidation of food processors, manufacturers, and retailers is changing the ways in which food is being produced and delivered to consumers. Increased demand by retailers for consistent products to be provided over wider geographic spaces is altering the way that our food is produced, bread being no exception. The need for large amounts of uniform product requires mass production. These production techniques frequently require more elaborate, larger-scale, automated technologies. Under managerial control (and viewed as a managerial prerogative), the adoption of such technologies has significant consequences for all food workers, especially those who are involved in food production in commercial and fully industrialized food manufacturing and preparation facilities. As has been demonstrated in other studies, new technologies can lead to a loss of skills. In particular, when skill is understood as technique, deskilling can be rapid. In some cases the adoption of automated technologies may eliminate jobs altogether. But skill is a multifaceted and multidimensional phenomenon, and includes other components such as autonomy and social standing. An investigation of the changing skills of bakers requires understanding not only how technologies have altered the bread-making process, but also how decision-making structures and power relations play a role in the reorganization and execution of bakery work.

5.0 OBSERVATIONS AND FINDINGS

5.1 INTRODUCTION

The intent of the research is to uncover how different production technologies and contexts affect the bread-making process and the skills of bakers and related food workers. The focus of the data collection process is to understand the interplay between the human actors, the technologies, and the bread products being produced. This investigation also focuses on the relationships between individuals engaged directly in the workplace and the managers who serve at various levels.

When observing the research sites, there were several aspects to which I chose to direct particular attention. The first of these was how the workers interacted with machinery. It was important to observe the bread-making process at multiple facilities that used different scales of technology, as scale may affect how workers function in relation to machines. An important purpose of the workplace observations was to discover the extent to which the workers exhibited control and or mastery of the machinery in the workplace.

Second, with particular reference to bread making, I was interested to observe the amount of time the bakers spent working hands-on with the dough. Much of the skill associated with working in the food sector is related to preparing and manipulating raw ingredients and bringing them together to make a saleable product. In this connection, it was important to discover the changes that have occurred with respect to the ingredients and inputs used in bread making over time, particularly from the perspective of the bakers.

Third, it is important to consider how the social relationships that are essential and central aspects of the production process also influence the skills of workers. An integral part of understanding skill as autonomy and control is to uncover the trade-offs involved for workers as they strive to preserve their autonomy and influence with respect to workplace decisions. The research seeks to uncover how the bakers perceive autonomy and how they understand the actions of management.

In order to best analyze the observational and interview data collected during the research process, the field research is presented in three sections. The first section consists of accounts of each work environment under study. The purpose is to describe the scope of production in each baking facility, the technologies in place, and the tasks and workdays of the workers. These descriptions are the basis for comparisons of the different jobs in the workplaces and a means of exploring the interplay between technology and skill in various settings. The second section consists of a more detailed analysis of the observations presented in section one. It is here that I return again to the concept of deskilling. Drawing on the personal work histories of the bakery workers and the managers of the different facilities, and combining this information with the observations made in the several work environments under study, I explore the deskilling that is occurring as a result of technological changes, economic pressures, and continued shifts in decision-making authority. In the third section, the Essential Skills program is revisited. The evidence presented here suggests that this program will have complex implications for workplace organization and politics, and is not necessarily the progressive force it claims to be with respect to preparing workers for an emerging knowledge-based economy. While it draws attention to some skills, it ignores others and

lumps workers into broad categories that erase important differences. Rather than assisting managers and workers to recognize skills and to adapt to new requirements, it may serve as a means to further dominate and marginalize workers and other vulnerable groups. At the end of this chapter, a concluding summary of findings is presented, which sets the stage for a broader discussion of the implications of this research and of the conditions it reveals.

5.2 THE WORK ENVIRONMENTS

For this study, I chose to observe three different kinds of work environments related to bread production. The first of these was the bakery of an urban retail co-operative. At this main research site, systematic observations were conducted for eleven full days over a two-week period. In addition to the research at this site, two industrial bakeries located in western Canada were chosen for study. Unfortunately, these facilities, though open to my visits, were not as accommodating as the Co-op bakery. Rather than extensive observation periods, observation of these facilities was limited to relatively brief guided tours. The final research site for this project was a large-scale industrial mill where the flours and mixes for the aforementioned baking facilities are produced. Observation in this case was not permitted. However, the findings from an interview conducted with the manager of this facility are included in the discussion about skills and deskilling.

5.2.1 THE CO-OP BAKERY

The Co-op bakery was the principal field research site for this thesis project. This section presents a preliminary description of the facility, an overview of the goods

produced in the bakery, an account of the staff and their positions within the bakery together with how their shifts are arranged, an inventory of the key equipment/machines, and descriptions of how various pieces of equipment are used.

The bakery studied is in many ways the flagship bakery for the Saskatoon Co-op's grocery stores. Not only does it function as a production unit for the Co-op, it also serves as showpiece for the store. In adopting the design tactics of many newer grocery stores, the bakery is close to the entrance of the store. Furthermore, the bakery has a semi-open design, meaning that some of what happens in the bakery is seen (and smelled) by the customers in the store. However, the bakery is not completely open, and the view available to customers is clear only from a small section of the store; so, for the most part the bakery work is not visible.

The workday follows a set schedule, although there is variation on the weekend. During the week, the first baker arrives at 4:00 a.m. His job is to count the product that remains on the shelves from the previous day and then to decide how much product to make that day. They typically start by making 100% whole wheat bread, which is a scratch mix, and then move into white and 60% whole wheat, in relatively large batches. In addition, the first baker bakes-off the frozen pastries and fridge loaves prepared the previous day. The next to arrive, at 5:00 a.m., is the first production assistant. This individual is responsible for the removal of old bread from the shelves as well as pulling frozen goods that go directly to the retail shelves without baking. Beyond these responsibilities, they must ensure that all products are correctly labelled and priced/dated. The first cake decorator arrives at 6:00 a.m.; her responsibilities are to decorate cakes and prepare fancy products for the deli. The next worker to arrive is the second baker, at 7:00

a.m. Their job is to assist the first baker with the plan they have set out for the day. Later on they will also be responsible for the products other than bread, such as muffins, cookies, and cakes. Also arriving at 7:00 a.m. is the bakery manager. For the most part, it is not his responsibility to bake. His tasks generally include inventory, ordering, checking on sales, budgeting, and ensuring that the bakery runs smoothly. However, due to exceptional circumstances during the research period, the manager was working directly in the production process much more than usual.

The next employee to arrive is the second production assistant, typically around 12:00 p.m. This individual is a part-time worker, scheduled to work until 6:00 p.m. Their responsibilities are the same as the other production assistant. They are to get product onto the shelves located on the sales floor, and to pull products from the freezer when necessary. At 2:00 p.m. the second cake decorator arrives. The cake decorators are the showcase individuals for the bakery. They work in plain view of the customers, and are usually the first to deal with their questions even if they have to defer them to another employee.

On weekends the schedule is altered slightly. The first baker arrives at 3:00 a.m., with the second baker joining the fray at 5:00 a.m. The first production assistant still arrives at 5:00 a.m., but the second arrives at 10:00 a.m. instead of 12:00 p.m. On the weekends, cake decorators start at 6:00 a.m. and 10:00 a.m., with perhaps a third joining later to keep up with demand (more cakes are needed on the weekend).

There are several important and substantial pieces of equipment used by the bakers. This section includes descriptions of the machinery used most extensively by the bakers. There are two mixers, one large and one small. The large mixer is used for the

staple breads, such as white bread, 60 % whole wheat, 100% whole wheat, sweet dough, and two other multi-grain style breads. The smaller mixer is used for specialty dough, such as rye, sour dough, and pumpernickel, along with the batter for cakes, cookies and biscuits. Located in between the two mixers is a computerized water meter which delivers precise amounts of water (by weight) at a specific temperature. The bakers weigh out the appropriate amounts of dough using a simple balance scale with a variety of counterweights. Also present in the bakery is a bun rounder, which is used to form three dozen buns at a given time. A dough divider is used to separate larger quantities of dough into loaf-sized portions.

A sheeter is used to form the appropriate amount of dough into uncooked loaves. The sheeter is a machine that has been employed by bakers for decades as an alternative to forming loaves by hand. When preparing hundreds of loaves a day, hand forming would be very time consuming. The bakery also has one large proofer²⁴, which can hold 6 baking racks²⁵. Two rack ovens are used to bake the bread, each holding one full rack at a time. The ovens are approximately seven feet tall, five feet wide, and five feet deep. The machines listed represent the principal equipment necessary for bread production. Other technologies used in this workplace include a bread slicer, ticketing computer, industrial dishwasher, a walk-in freezer and a walk-in refrigerator.

The following is an account of the bread making process including more complete descriptions of the machines and how they work. The first step in the process is for the bakers to prepare the dough. The ingredients are added to the mixer, and usually include

²⁴ Proofers are climate-controlled rooms (warm and humid) where bread is left to rise before baking.

²⁵ The baking racks can hold up to two dozen baking sheets (back to back, 12 on each side). The baking sheets are roughly 24 inches by 18 inches. The racks have casters on the bottom and are approximately 6 feet in height.

enriched flour, a bread base, yeast, and water. The flours are in 25-30 kilogram bags that are stacked on pallets on the floor near to the mixer. The bakers typically estimate the ingredients, with the exception of the yeast. On occasion the bakers will use a scale to ensure they have enough flour and base. The water is added using the meter, which requires the bakers to key in an appropriate weight of water. For the majority of the mixes the bakers initially add a large quantity of water and then add small increments to reach the desired consistency. The large mixer is used for most kinds of dough, including white, French, sweet dough, 60% whole wheat, 100% whole wheat, Nordic, Alpine, and sour dough. Both the bowl and the dough arm rotate counter-clockwise. The mixer has two speeds, low and high, and separate timers for each speed function. All mixes start off slow as the water is added. The mixer then gears up to higher speed, mixing and kneading the dough vigorously. While the timer is set for the high speed, it is not unusual for the bakers to stop it before the timer alerts them, or have it run a bit longer after the timer expires.

After the dough is mixed and moved to the table, the bakers scale it by hand. Rather than create the perfect balance, the bakers observe the speed at which the dough falls once placed on the scale. If it falls too fast there is too much—a gradual descent is preferred. After the quantities are scaled out, the dough is either divided or rounded. The dough divider works by manually lifting the lid fully up. This action drops the inner tray, which is divided into 20 tiles of equal size (four by five). For hot breads (non-sliced) 24 pounds of dough are placed in the tray; for sliced bread 29 ½ pounds of dough are used. Once the lid is closed, the divider, using a hydraulic, presses the dough up against the lid. This disperses the dough evenly across the surface of the tray (a uniform amount over

each tile). A grid-like blade is then triggered from the bottom of the machine, and cuts the dough into 20 uniform portions.

The bun rounder is used by spreading dough, anywhere from 3 pounds and 12 ounces to 6 pounds at a time, on a tray with 36 divots. The tray is then placed in the divider, which has a large lid. The height of the lid is adjusted for the different amounts of dough used. This is done by manually turning a metal screw, which has numbers representing the different weights on it. The lid is pulled down with a large lever, which takes a good effort on the part of the baker. This helps to flatten the dough evenly. Before the lid is fully down, the blades are engaged using another lever (this lever moves side to side), dividing the dough into 36 relatively equal portions. Once the blades are engaged, the lid is dropped all the way down, applying more pressure to the dough. A final lever is then engaged which triggers the base to rotate and vibrate (a hula-hoop type motion). The combination of the pressure and the movement of the base rounds the 36 portions into bun shapes. The entire process takes about 25 seconds, with 7 to 10 seconds of actual powered machine time.

As one might expect, bigger buns require more time in the machine. In most cases, the size of bun generated by the machine is used as is. However, combining two buns and sending them through the sheeter makes the submarine sandwich (sub) buns and hoagie buns. Tea buns are made by dividing the machine-rounded buns into two. Using the edge of their hands, the bakers slice through the dough by moving the hand back and forth, rolling out two buns. The final variation produced from the bun rounder is torpedo buns. In this instance the rounded buns are rolled out under the hands of the bakers into oval-shaped rolls.

Bread dough that has been separated in the divider is further processed in the sheeter. The sheeter is used to roll the dough into loaves. After the divider cuts the appropriate quantity of dough into loaf-size portions, the baker tosses the lumps of dough into the feeding area of the sheeter. In the first step of the machining process, the dough is flattened (rolled out) as it moves through two heavy rollers. Moving to the lower level, the dough is then rolled up by passing under a chain-mail blanket. In the final step, the now-rolled dough proceeds under a metal plate that compacts the dough, ensuring a nice tight roll. This step also guarantees a uniform length to the loaves as the sides of the plate trim off the excess dough—which is typically a very small amount, if any. For steps two and three, the bread is moving along a short conveyor belt. At the end, the bread falls onto a rack. The unbaked breads are then placed by hand into quadruple loaf pans (or on baking sheets), and racked for proofing and baking. The sheeter is equipped with a safety lever at the feed mouth in case someone puts a hand in the machine, getting it caught in the rollers. The dough sometimes trips this lever when the bakers throw it into the feeder. When working alone, the bakers will stand further back, where the rolled loaves emerge, and throw the dough from there. This allows them to roll formed dough and rack unbaked bread at the same time.

The formed, but as yet uncooked, buns and loaves are placed on trays or in pans, and these are placed on large wheeled racks. The racks are then transferred to the proofer where the bread typically rises for about an hour. After the appropriate amount of time in the proofer, which is estimated by the bakers, the bread is moved to the oven where it is baked. The bakers are responsible for the removal of the bread from the oven and the transfer of the loaves to cooling racks. Once the bread or buns are placed on the racks to

cool, the bakers have completed their work. At this point in the process the production assistants slice, bag, and price the products, after which they place them on the sales floor. Not including the time spent by the production assistants on these final steps, the bread-making process from mix to baked takes approximately two and a half hours. The daily output of this bakery is approximately 500 loaves and 100 dozen buns, along with varying quantities of cinnamon buns, biscuits, cookies and cakes.

5.2.1.1 THE BAKERS

The Co-op bakery employs three bakers and a bakery manager. Two of the bakers work full-time and the third baker works part-time. The bakery manager is also a full-time employee. The bakers and the bakery manager bring varied experiences to the work environment, but each has a wealth of baking knowledge to draw upon. Interviews were conducted with one of the full-time bakers, the part-time baker, and the bakery manager.²⁶ In addition to these interviews, the manager of the grocery store was also interviewed.

There has been a concerted effort on the part of the Co-op to ensure that the individuals working in the bakery are skilled in their trade. The full-time baker started baking 34 years ago at a small neighbourhood bakery in Saskatoon. He received his training through this small bakery where he worked part-time for three and a half years. After circumstances compelled the baker to look for new work, he applied to the Co-op. He was hired to work the night shift, and for over 25 years his main responsibility was to make bread to supply all of the Co-op stores in Saskatoon. Other duties for the baker included making muffins to supply co-operatives outside of Saskatoon. On occasion he

²⁶ One of the full-time bakers was not available for an interview at the time of the research.

would also bake specialty products for the store where he worked. He continued to work the night shift until he applied for a transfer to a different store. His desire for a change in work environment stemmed from his need to get away from working the night shift, which he said had taken a physical toll on him.

The part-time baker at the Co-op also arrived at the bakery with ample experience from other bakeries. His first job was as a baker at a small retail bakery in Regina, Saskatchewan. The bakery he started at was fully a scratch bakery, and he received all of his training on the job. In addition to making bread, he was also taught to make other fancy products such as pastries. Before his arrival at the Co-op, this baker also had managerial experience from an in-store bakery with a competing super-market franchise in Saskatoon.

The bakery manager, like his fellow employees, is a skilled baker, who has practiced his trade over many years. His first baking job was in a small retail bakery in a rural Saskatchewan community. He expressed a long interest in baking, in large part due to his mother's dedication to home baking. His first position in a bakery was part-time, and the bulk of his hours were worked over the summer. When he needed to find more stable, year-round employment in the baking field, it was his father who informed him of an opening with the Co-op. He started there as a baker's assistant. His initial training at the Co-op was on-the-job. However, his ambition was to become a journeyman baker and to find a more senior position either within or outside of the Co-op.

He recognized, however, that with respect to baking there were few opportunities for formal training. While he learned on-the-job from an extremely knowledgeable baker, the Co-op did not offer any training that would help him to gain certification. The

manager took it upon himself to advance his own training, taking several baking courses through the Baking Council of Canada. It was only after the fact, when one of his superiors found out what he had done, that he was reimbursed for the expenses involved.

After he completed the courses a full-time baking position opened up at the Co-op. Having worked in this position for a few years, he decided that it was time to challenge for his journeyman's paper. This process proved logistically difficult as Saskatchewan does not have a journeyman's program for bakers. Individuals seeking this designation must challenge an exam in Manitoba or Alberta. This expense would have fallen on the baker had his manager at the time not stepped in. In many cases, the Co-op does assist their workers financially if they opt to pursue training related to their position.

Once established as a baker in the co-operative system, the baker who is now the bakery manager decided that he would like to pursue a career with the Co-op in a management capacity. This aspect of training is well-supported by the Co-op. For his managerial training, the baker was stationed at a Co-op in Regina where he trained for approximately one month. By the end of that training period he was independently managing the in-store bakery on a daily basis. Once his training was complete, he was transferred to a Co-op in rural Saskatchewan. When a bakery manager position opened up in Saskatoon, he applied and was awarded the position.

5.2.1.2 THE MANAGERS

The research process also included interviews with two other managers who had responsibilities outside the bakery. The first of these was the manager of the grocery store that contains the bakery that served as the primary research site; the second person was

the manager at FCL who is responsible for overseeing the bakery operations for all affiliated co-operatives in western Canada. The manager of the grocery store started working at a co-operative grocery store in British Columbia as a part-time employee while still in high school. Upon graduation in the late 1970s, he was promoted to Assistant Grocery Manager, and later Grocery Manager. In addition to his career path in the managerial stream, the individual also worked in the bakery for a period of six months when one of the bakers was on leave. After his time in British Columbia, the manager worked in an urban Alberta setting as one of their food store managers. In 1990, after three years with the Alberta-based co-operative, he and his family relocated to Saskatoon. From that time on, he has spent time as a store manager at all three of the Co-op grocery stores in Saskatoon, and has been managing the store that served as the primary research site since 2002 when the store opened.

All of his formal training toward the management of a grocery store was provided by FCL. The first programs that he attended took place at what was then known as the Co-operative College in Saskatoon. Each session, which included topics such as supervision, recruitment, training, and financial management, would last one week. That program has since been discontinued, and most training now occurs on a one-on-one basis in the grocery stores with the costs covered by FCL. Employees looking to broaden their managerial skills are also able to take courses in the school of business at the University of Saskatchewan, and work toward a Business Administration Certificate program (BAC). The program is well-suited for FCL, and individuals who take the course have 75 per cent of the costs covered by FCL. The other 25 per cent is their own

responsibility. The BAC course is tailored for individuals who are interested in career options with FCL.

The manager at FCL, like the other key informants interviewed for this thesis, has a long history with co-operatives. His first job, at the age of fifteen, was with a Co-op bakery in rural Saskatchewan. After graduating high school, he moved on to a bakery located in a Regina Co-op. He then went on to manage a bakery in a rural Saskatchewan Co-op. After managing that Co-op for several years he left the organization to “spread his wings, and to make sure that (baking) was what he wanted to do.” He quickly returned to baking, although not with a co-operative. For several years he worked at a plant that was working toward the development of frozen baked goods. After his tenure with that enterprise he took a position at FCL as a bakery coordinator, essentially second in command for bakery operations. After his superior left, he moved into the manager position where he continues to work.

5.2.2 INDUSTRIAL FACILITY A

This factory is located in a western Canadian city and is almost 30 years old. There have been relatively few changes in the production process over the life of this plant. The facility produces bread and buns only, and as these are staple products the production line has not needed significant alteration. Most of the changes have taken place at the packaging end of the production line. The breads made in this facility are shipped across Western Canada, although Alberta is the primary market. From start to finish, the bread takes two and a half hours to prepare in this industrial facility. The facility is able to produce approximately 110 loaves of bread per minute. On a day

without maintenance the facility will bake over 155,000 loaves.²⁷ The bakery is classified as a fresh bakery, which means that at this particular plant they only produce fully baked loaves and buns. The company owns other facilities in the area which are responsible for ‘prebakes’ or frozen products. At the time of the visit, the employee complement was as follows: one production manager, three office staff (sales, book-keeping), four workers on the bagging line, four shipper/receivers, three maintenance staff, and three individuals working the bread production line. During the site visit, the bun line was shut down; normally it would require three additional workers.

At the bread line, one worker tends to the mixing machine, although a semi-automated process controlled by computers performs most of the mixing. The mixers (two for bread) stand around 15 feet tall. Several pipes are attached to the top of the mixer. In turn, these pipes lead to silos which house the major ingredients including, flour, water, sugar, yeast, and the bread bases. As is the case with the in-store bakery, bases developed by the company’s research and design department are used, as a part of the chemically complex recipes. The amount of each ingredient fed into the mixer is precisely measured to ensure the highest level of consistency from loaf to loaf. The worker employed at the mixing station only adds certain more novel ingredients that are required in small amounts. Given the size of the machine, however, a “small amount” is equivalent to a four-gallon pail. The worker triggers the mixer by utilizing a simple keypad, with no more controls than the spiral mixers in the Co-op bakery. When the mix phase is completed (approximately 15 minutes depending on the dough), a large trough automatically moves via a track over to the front of the mixer. The mixer then dumps the dough into the trough-like bin, much like a front-end loader dropping a bucket of gravel

²⁷ The facility produces bread 24 hours per day, seven days a week.

into a dump truck. The amount of dough being dumped cannot exceed 800 kilograms (1760 pounds), which is enough dough to make over 1700 loaves of bread. Sales volume for this facility rarely requires that all batches be made to this size. The bin containing the dough is then moved by automated machinery towards a conveyor belt and the dough enters the next step of the process.

The bin is lifted (by machinery) above a floor level conveyor belt, and the dough emerges from the bottom in a long, tube-like form, not unlike toothpaste. This dough moves along the conveyor until it reaches an elevator that moves upward; as it does the dough is divided into chunks. At the top of the lift, these large chunks are divided into two smaller portions which will become loaves in later stages. These two separate balls of dough are fed onto the same conveyor, but alternate from the left side to the right. These new lines of dough then branch out on two different conveyor lines, each leading to two different sheeters. The sheeters are fed through the top, and the dough drops through the rollers and is flattened. The dough then moves onto a second conveyor where it is rolled underneath a chain. At the end of this line, the rolled loaf is dropped into a quadruple loaf pan. The pan then moves along the line into the proofer, where it stays for the next hour. The proofer itself is a large structure with the capacity to house several hundred loaves. The environment within the proofer is controlled by computer, which is necessary as the conveyor moves through the proofer at all times. One employee attends to the area in which the bread is divided, sheeted and rolled. The process, from distribution bin and into the proofer, takes less than three minutes.

After the bread leaves the proofer, it rolls in the pans along the conveyor line past a third employee. It is the responsibility of this individual to monitor the bread to make

sure it is uniform and that all pans are full. In addition, they may be required to put lids on the pans in the case that the loaves are to become square sandwich bread. The loaves then continue on to a rotating oven. The trays are lined up, and 60 loaves enter the oven at a given time. The oven has a capacity of 600 loaves. Baking time is usually 20 minutes, at 450 degrees, a temperature much hotter than that used for traditional baking. The ability to bake at higher temperatures is achieved through the engineering of the dough, which has been “perfected” over many decades of research and design. The oven itself runs unmonitored and is only periodically checked for problems.

When the baking is complete, the bread proceeds along the conveyor line to the removal station. The pans move under a roller with rows of small suction cups that grip the bread and pull it from the pan. From this point two new conveyors take over. The first takes the bread up into the rafters of the facility, where it travels in ovals in order to cool. This track continues in spiral layers, developed to a length that allows the bread to cool for close to an hour. A second conveyor takes the empty bread pans back to the start of the production line. At no point in the entire process does an employee have direct contact with any dough or with a baking pan.

Once the bread has cooled, it proceeds along the conveyor line to the slicing and bagging station. Before being sliced, all the loaves pass through a metal detector to make sure that they are ‘clean’. Once through this test, the bread is lined up and sliced by an automatic slicer. It then moves into a chamber where it is bagged mechanically. The bagged loaves move to a final conveyor where, depending on the type of bread, they are arranged by the machine in the proper configuration of loaves and dropped onto plastic pallets. The pallets are then stacked by forklift, and are ready for shipping.

At the slicing and bagging station, the employees ensure that the proper bags are loaded into the equipment, and make certain that the machinery does not jam. Any problem needs to be rectified quickly or multiple loaves will be rendered waste. The employees also perform quality control. These quality inspections include ensuring the proper packaging is in place, the date is correct and clear, and that the correct number of slices is included in every loaf. The inspections are spot inspections only. At the end of the entire process, a saleable loaf of bread is produced.

5.2.3 INDUSTRIAL FACILITY B

When entering industrial facility B, the space appears cavernous. The huge warehouse is home to several enclosed structures that dwarf some of the homes in my own neighbourhood. These structures are the Mecatherm, an almost fully automated bread-making machine which includes proofers, ovens, and freezers. The first step in the process at the facility is the preparation of the mix. The bread line here is actually less advanced in some respects than the one at facility A, despite the fact that it is newer. At this facility, only the flour and water are added mechanically from silos. The rest of the ingredients are measured out and added by workers. Given the complexity of the freezing process that is the hallmark of the Mecatherm, the lack of automation in adding the ingredients to the mixers stands as an anomaly. There are six workers in total for the two lines. These workers are responsible for adding the sugars, yeast, oils, and bases to the mixers. This facility uses tumble mixers for bagels but the breads are mixed in spiral mixers like the ones used in the Co-op bakery. The mixers at this facility are

approximately three times the size of those at the Co-op, however, and are also equipped with dough lifters.

Upon completion of the mix, the workers use the lifter to elevate and tilt the bowl, and then proceed to dump the dough into a bin. Here the work gets a little more hands-on, as at times the workers must cut the dough and remove it, work akin to that observed in the Co-op bakery. Once the bin is full, it is manually wheeled over to an elevator. The entire bin is then mechanically lifted and tilted, the dough falls into a large hopper. This hopper leads to a dough divider, where the dough is pushed through the end of the hopper and cut to the exact weight necessary for the loaf being produced. These portions of dough fall onto a conveyor line which leads to the sheeter. After being rolled into a standard loaf size, the dough can be further manipulated in the final machine process. At the last stage, adjustments can be made to create different types of bread. On the day of my site visit, one machine was producing rolls for a popular Canadian doughnut chain and the other baguettes for a Texas grocery chain. At the end of the sheeting/forming process, the loaves are dropped into the necessary pans which are put in place by the workers who are also tending the mixers.

From the sheeter, the loaves are conveyed to the proofer. Once the bread pans (or baking sheets) arrive at the proofer they are arranged in rows of four. The row of pans then mechanically enters the proofer onto a platform just large enough to hold all the pans. There are multiple platforms, stacked 30 or so high, which move up, then over, and then down; the cycle is repeated several times until they have spent approximately an hour in the proofing chamber. At the end of the cycle, they exit onto a conveyor and are

shuffled into the scoring chamber. A machine scores²⁸ the loaves mechanically with several blades, enough to score 16 baguettes or 64 rolls at one time. This takes only a few seconds.

After the loaves are scored they move into the oven to bake. The oven, like the proofer, uses a series of elevators to move the baking breads through the continuous process, the difference being that the bread moves through the oven much more rapidly. After leaving the oven, the bread moves through a brief cooling stage. During this time the bread spirals upward on conveyors, and then descends downward to the freezer. Once again, the bread moves through a series of elevators during the freezing process. Depending on the extent to which the bread is baked, and depending on customer specifications, the bread can be in the freezer for anywhere from 30 to 60 minutes.

With the Mecatherm, bread making is almost an entirely automated process. Because of this, workers are only continuously present and physically involved where the mixes are prepared at the beginning of the process. Along the rest of the production line, there is one employee who periodically walks the line to ensure the process is functioning properly. According to the manager of facility B, the Mecatherm represents the most advanced bread making technology in the world. Established in 1964 in France, Mecatherm has been developing automated bread-making processes for over 40 years. Their first fully automated production line for frozen bread products was introduced in 1985. The Megaline model at the research site was brought to market in 2000.²⁹

²⁸ A loaf is scored by making a small cut or cuts (only a few millimeters deep) along or across the top.

²⁹ Information on Mecatherm was taken from the company website (<http://www.mecatherm.fr/en/>).

5.3 DESKILLING APPLIED

The actual process of making bread in each of the bakeries described above is quite similar with respect to the execution of a mix, panning the loaves, proofing and baking. All three bakeries use similar inputs in terms of flours, bases, and other ingredients, and the elapsed time to produce a loaf varies minimally. However, when assessing the technological scale and social relations of production, the three bakeries represent three rather different worksites.

Earlier in this thesis, the economic logics surrounding the restructuring of the grocery industry were briefly addressed. It is important to reflect upon how the marketplace, translated through the rationality of managers and owners, impacts the work of bakers and alters the bread making process. The consolidation of grocers, the design of supermarkets serving larger markets, and the increased demand for product consistency, all have important implications for how bread is made. The bakers at the Co-op would frequently estimate, rather than measure, the required amounts of each ingredient. While the baked goods produced were generally consistent, one could see variation in the products. On several occasions, I observed that the work of two different bakers would result in the same bread having a slightly different appearance. With bakers rolling buns by hand, varying the ingredients, or removing the bread from the ovens after different amounts of elapsed time, the finished look of the bread would vary.

Once bagged, there would be slight differentiation between the loaves. While only the most exacting customer would notice, there was nevertheless a slight amount of variation to a systematic observer. Such inconsistencies frighten larger scale producers and have contributed to the increased mechanization of the bread making process. As the

manager at industrial facility B indicated, their corporate customers expect perfection, there is a little tolerance for inferior product, and inconsistencies in the product delivered will result in a loss of business. A marketplace where bread is bought and sold by the thousands of loaves is not conducive to a bread making process controlled and conducted by individuals. There is visible variation in the work of two bakers, never mind the hundreds it would take to supply and stock a regional or national grocery chain. The market pressures for consistency as well as low cost contribute to the growing mechanization and automation of bread production methods.

Discussion of the market pressures that affect changes in the baking process sets the stage for a broader discussion of deskilling. While market pressures may compel larger businesses to look at new technologies that produce more consistent and safer products, these technologies have implications for bakery workers. One approach to evaluating Braverman's deskilling hypothesis is to apply the findings from the field research to Standing's three-part definition of skill. Approaching the analysis in this way also provides an opportunity to critically assess Standing's definition, and to work towards an improved definition of skill. Furthermore, this analysis sets the stage for a discussion of the results in relation to the Essential Skills program and the writings of Braverman.

5.3.1 SKILL AS TECHNIQUE

Recalling the earlier literature review, the first component of skill is technique (Standing, 1992). Here we are analyzing skill as the actual process of doing. In the bakeries observed during the research process, there are significant implications for the

techniques employed by workers as scale of the technologies increase. At the Co-op bakery, a significant portion of the work is hands-on. For example, when preparing a batch of white bread, the bakers would physically add the ingredients, they would make sure that the mixer was set up properly, and use their senses to determine the readiness of the dough. They could tell if the dough was ready for use when it felt right, or by the slapping sound the dough would make against the dough arm when the mix was just right. They could also determine if the dough was ready by its appearance. Once the dough was ready, they would scale the dough by hand on an old fashioned balance.

From here, the workplace technologies would begin to play a greater role. The bun rounder, dough divider, and sheeter, would be used in the formation of many products, including standard loaves and most buns. Nevertheless, many of the specialty products would still be made by hand, including cinnamon buns, tea buns, cheese twists, and Parker buns. The formed products would be taken to the proofer to rise, and later baked in the ovens. What is most notable about the baking and proofing times is that in most cases the workers mentally internalize and calculate the time spent in each process. Rather than a timer, it is this judgment and the appearance of dough that leads them to remove the product from the proofer and bake it. While oven timers are set, the bakers would frequently arrive to check on the product moments before the timers would alert them.

Adjustments in the baking time were made based on the feel and appearance of the products. On one occasion in the bakery there was a power outage. Without hesitation the bakery manager, who was baking alone due to scheduling conflicts, looked at the breads being baked, and reset the timers on the ovens. When asked how he knew how

much time was left, he simply remarked that “they looked like they needed eight minutes.” While the production technologies are designed to allow a certain output capacity, it is obvious that the bakers working at the Co-op exhibit a high level of practical and embodied knowledge, and physical prowess. They are very familiar with the products they use, the rheological properties of the dough they work with, and what constitutes a workable dough. They also exhibit body/hand skills that allow them to work quickly and effectively to accomplish multiple tasks concurrently.

The bakers acknowledge that many of the skills and the knowledge that they deploy in the workplace are the result of their years of experience. As the younger baker remarked:

Yeah, it's about experience. You can compensate for things, if you throw a fast dough behind a slower dough you can cool the water off to slow it down, there are lots of little tricks you can do. You can put things in the oven at a lower temperature to get more jump out of them There's lots of different little tricks you can pick up that will help you be able to make your day run smoother, but if you are not planning ahead you are going to wind up in trouble in proofing a lot of things, product getting wrecked, ruined.

Over time, each of the bakers has developed an intimate knowledge of the baking process. This allows them to ensure that they deliver a consistent (though not necessarily identical) product to the store shelves. Moreover, when complications arise in the course of the workday they are able to resolve the issues quickly and effectively.

If you're out something and it's a sale item, and you haven't made enough the first time, you have to be able to react. All of a sudden, the 60 loaves that you made that you figured was going to get you through, somebody's looking for it at one o'clock in the afternoon, then you have to be flexible enough to make some more if you want to make your sales, and that takes some experience. Probably a few bad days to get the point home too!

For the bakers, understanding the time required for the preparation of the different breads and observing and understanding how the dough behaves through the bread making process is crucial. Rigidity with respect to the timing of the workday can be counterproductive. There is also a need to quickly recognize what is happening with the product; failure to do so may result in wastage and increase the pressure on the bakers to replace a batch of bread. As one baker remarked:

You know basically when (the dough) should be ready and you keep an eye on the goods when you put a rack in the proofer, and you see that this has about ten minutes. Oh cool, the oven is done in nine so it will be going there. And you just work it out. Time after time, day after day, I mean, you realize that okay you've got time, that when this comes out, this (has to) go in, so you better be ready. You know, leave it outside of the proofer for 20 minutes if necessary, if it's getting too big and then go from there.

The internalization of the work process, the deep knowledge of baking, and the skills required to bake are not seemingly threatened by the technologies in the bakery that are used in mixing, forming, and baking of bread and bakery products. There are, however, technologies in the workplace that do threaten the skills of the workers. The bread bases and mixes especially, are problematic for the workers. Mixes developed outside of the bakery are increasingly prevalent. In almost two weeks of observation, I only saw a handful of products being made from scratch. On a daily basis, the only scratch product that was made was 100% whole wheat bread. The process for making this bread included scaling the flours, sugar, yeast, wheat bran, and salt, and carefully adding the liquids (water and molasses). Other products made from scratch included biscuits (assorted types), cookies, carrot cakes and muffins, and bran muffins. However, these products only needed to be made once every few days. In all cases except the biscuits, the bakers would make large amounts of the batter and refrigerate them for later use. With

the exception of these products, all other baked goods were primarily a mix of flour, water, yeast, and a specific (industrial) base.

The bases are the black box technologies of the bakeries. They are designed to provide a consistent, commercially acceptable, and palatable product. The bases were not fully understood by the bakers, though they all recognized that their use can speed up the process and yield consistent bread. However, when asked about ingredients such as calcium propionate, sodium stearoyl lactylate, and enzymes, none of the bakers were able to explain what they were or what their function was. These three ingredients are key actors in the development of no-time dough; working together they significantly reduce the time needed for bread to mix, rise, and bake.

One baker mentioned that he strongly dislikes the mixes. Having made bread from scratch on the nightshift for almost ten years, he is bothered by the emergence of bread bases.

It took me a long time to get used to that stuff. I mean, I took it as an affront. Okay, fine I'm not good enough to make this stuff, and basically as time wore on it was just one less thing I have to make. And you move on. I'd rather go back to scratch. I think they last longer on the shelf. I think we have enough additives in our systems that we don't need to be adding more to them. You know like, dough conditioners and stuff like that. Let's go back to the regular scratch recipes.

He recalled an occasion where the bread he was making with the base was continually flopping. When he approached management about the problem, they immediately questioned him about what he was doing wrong. It was not until after they had watched him go through the process over again that they finally concluded something was wrong with the base itself.

The baker found two things frustrating about this situation. First, he was upset by the reluctance of management to take his word that there was something wrong with the product. The managers had put their faith in the “infallible” technology over the worker. Second, had the baker “flopped” a batch of bread he was making from scratch, he would have been able to retrace his steps and determine what went wrong; with the mix doing so is impossible—it is beyond his control). Had the bad batch been the result of his error in making the bread from scratch he would have accepted the blame and redoubled his efforts to produce a new batch of bread. Instead, time was wasted making another bad batch, and arranging for the removal and replacement of the mix. Furthermore, he still had to bake from scratch to satisfy the product demands for the day.

The interviews with the bakers revealed a strong sense of craft-pride. The introduction of the mixes was perceived as a loss of control and as an affront to their status as skilled workers and artisans. As one baker remarked:

I don't like counting on anybody else. And that's what we are doing when we bring in a bread mix. They screw it up at the plant, and the first thing that happens is that our manager looks at us and asks us “what did you do wrong?” I don't know, we didn't do nothing wrong, this stuff is crap.

The decision to use these mixes does not lie with the bakers but with the bakery manager at Federated Co-operative Limited (FCL), who, in his own words, chooses to use these inputs in order to “produce a consistent product” and “speed up the production time for the bakers.” When looking at the disparate positions of the bakers and managers, we see the struggle for control over the process of work, a hallmark of the deskilling hypothesis. The fact that the mixes are entering the workplace at the behest of managers, despite the preferences of the bakers, can be taken as evidence for deskilling. In the case of skill as technique, we can see how the mixes reduce many of the cognitive demands

originally part of the skill sets of bakers. Complex numeracy skills are fading, as fewer measurements are required. Further, bakers no longer need to understand the interactions between ingredients; that aspect of bread-making knowledge is removed from the bakery and embedded in the test kitchen and laboratory-formulated industrial bases.

Similar to the introduction of industrial bases, the use of frozen dough and products has significantly altered bakery work. Fancy products that formerly demanded the most intricate skills and knowledge of the bakers are no longer made from scratch in the bakeries. In a discussion focused on major changes in the baking industry one of the bakers stated the biggest change in the industry over his baking career has been the introduction of frozen dough.

It's frozen dough, oh yeah. Frozen dough and with frozen dough it opens up so many different places, you know like [small unconventional bakery site]. There is only so many dollars that are going to be spent in Saskatoon on baking. I mean more and more people are buying baking, yeah. Less people have time to do their own home baking, that's another dying art. I mean, mothers used to bake to home, who has time anymore? Nobody, with today's society. But, the frozen dough allows more places to open and there's less smaller pieces of the pie for whoever is out there. I mean, it may not be big slice, just little bites, like another Tim Horton's opening up, 'baking' their own buns and whatever little deal. I mean, there again. They're not mixing their own, they're bringing in frozen buns, they thaw out, proof up, and bake off. There's your fresh bun. The (customer) figures it was made in the back. It was probably made six months before in Regina.

For this particular baker, the introduction of frozen dough into the marketplace has been a trigger for deskilling in the baking industry.

You don't need to know whole lot anymore. I mean nobody makes, maybe some of the small independents will make their own puff pastries, their own Danish. I have vague memories how to make that. I mean, yeah, could I make my own Danish pastry? Yeah, with a recipe, yeah I could probably wing it. I haven't made it in 25 years, you don't need to, you can bring it in frozen. I mean, that's what's happening. Like I say with the (small unconventional bakery), they throw the frozen loaf on a pan, put it

in the fridge overnight, proof it and bake it off. They don't have to mix nothing, they don't have to worry about whether that dough is over-mixed, under-mixed. Whether the ingredients are right. They don't need to know all that knowledge as to how to mix something. That's what's being lost.

Further to the lament of this baker with regard to the loss of baking knowledge, the bakers exhibited a certain skepticism about the motives for introducing frozen products into the baking industry. When questioned with respect to why retail bakeries choose to bring in bake-offs (frozen products), one baker responded that the products are most certainly money-savers:

If they don't have to pay people, it used to take me an hour, maybe a bit more, before I could even work doughnuts off, and now you can throw it on the table, put it into heads and then work them off almost immediately. You don't have the same difficulty, and if they can make it easier they can pay people less to do it. You're also saving yourself time. Well the company saves themselves the labour, because you have to do this and this, it's more money for the store. I understand fully why they do it, it's just kind of sad.

Industrial bases play a similar role in the industrial bakeries. In the case of facility A, there was no one working to prepare the mixes; the entire process was mechanized and computerized. In facility B, some workers are still required to manually add ingredients but the necessary additions were basically add-ins, usually measured and put in with large buckets. In these facilities, the process of making bread is, for all intents and purposes, a mechanized and computerized process. Machines form the loaves/buns, place them in pans, score them, precisely execute the proofing and baking times, and may also package the bread. The workers in these facilities require little or no knowledge of how to make bread or what to do in the case that an operation fails. In both of these facilities, a breakdown in production is solved by mechanics not the line workers.

The workers in the industrial bakeries are adjuncts to the machines, there only to monitor and to perform relatively simple tasks. In these facilities, the process of making bread has been recreated as a scientific, mechanical, and technological process. Bread is baked, but there are no bakers. As mentioned, when there is a problem with the process, the line workers are not called upon to correct the issue, only to report it for someone else to fix. This is in stark contrast to the Co-op bakery where it is the bakers who are called upon to solve problems and repair machines. Maintenance of machinery in the Co-op is the responsibility of the bakers: they are the first option. If they cannot perform the necessary repair, then an outsider is called in.

The bakers at the Co-op maintain an intimate understanding of the tools of their trade. As an example, when the proofer failed at the Co-op, rather than the operation coming to a standstill, one of the bakers used his knowledge to address the problem. The purpose of the proofer is to keep the bread warm and humid in order to allow the yeast to act and the dough to rise. The baker created a functioning proofer by using two electric kettles inside the broken proofer to increase the temperature and introduce moisture into the environment. In addition, the baker noted it was important to minimize time opening and closing the proofer so as to not lose the moisture introduced by the kettles. This example points to the resourcefulness of the bakers in solving problems, and to their ability to continue the work process when dealing with smaller-scale technologies. If the proofer at either of the industrial facilities failed, the only option would be to stop the line and to call in a technician to make the necessary repairs.

The above discussion points to the importance of scale and automation when assessing the role of technologies on changing skill sets. In the Co-op bakery where the

machines being used are significantly smaller, the impact on the skills of workers is considerably reduced. The mixers are the same height as the bakers and the bowls are similar in size to the drums of a large domestic washing machine. The dough divider and bun rounder stand chest high on an average individual, and the sheeter is the size of an office desk, only slightly narrower and approximately a foot taller.

The sheeter and the bun rounder have significantly reduced the work of bakers as they no longer have to form all their products by hand. These technologies are also long-standing tools of the trade and have changed little over the last several decades. Sheeters have long been used as a mechanical aid to increase the productive capacity of the bakery. In speaking with the bakers, the only change they could recall with respect to the bun rounder was that they had moved away from stainless steel trays and instead use plastic polymer. These bakers are quite intimately acquainted with the machines. They understand their functioning and mechanics and, when necessary, can repair them. In the case that a machine needs to be sent out for repairs, the bakers can cope and proceed to create the product by hand. As one baker remarked “it would just take a lot longer.” The only problem that could not be overcome by the Co-op bakers would be the loss of both ovens.

This arrangement is in stark contrast to the mammoth production lines of the industrial bakeries. In these facilities the failure of any machine effectively results in the shutdown of the line for repair. The line workers in these facilities rarely contribute to solving the problem. If the problem requires extensive downtime, the workers are sent home. With respect to the bread making process, the escalating scale of the technologies used helps to strip the workers of historical bread making skills. This aspect of the

deskilling of food workers is exacerbated by the advancement of black box technologies such as those involved in the development of industrial bases and bread mixes. This is one place where both groups of workers studied experience a loss in skill. In industrial facility A, no one even sees what enters the mixer—save one worker who adds extra ingredients when necessary. In facility B, while some ingredients are added, most are not exposed to the workers. In both of these facilities, little knowledge about bread making is exhibited; neither facility requires any experience making bread as a prerequisite to employment. The bases and mixes are the largest contributor to deskilling in the Co-op bakery. With the increased introduction of bases, mixes, and frozen products (discussion to follow), the bakers less frequently utilize the skills and knowledge they have cultivated over time.

According to one baker in the Co-op, the introduction of mixes completely changes bakery work, making it a job that anyone can do. He related that at the previous grocery chain where he had worked, he was the only person in the bakery who had any training or experience specific to baking. The employees he worked with were often students who sought part-time employment. This account of the staff at a competing retail bakery, coupled with the processes observed at the industrial bakery, creates a strong case for the existence of deskilling among food workers as a result of advancements in technologies and their introduction into the workplace.

5.3.2 AUTONOMY IN THE WORKPLACE

Standing's second component of skill refers to the autonomy a worker has over his or her work process and work environment. Having a central role in the decision

making process fosters the development of a workplace in which employees find satisfaction and meaning in their work. The observation and interview process revealed a steady decline in the autonomy experienced by workers involved in baking. The discussion of autonomy necessarily involves some overlap with the previous sections, as many aspects of workplace and work process reorganization affect skill in terms of autonomy and technique.

On a day-to-day basis, the workers in the Co-op bakery exhibit considerable autonomy. Decisions about how much of each product to bake, and what order to bake the products in, are at least partly the discretion of the bakers. The decisions they make are dictated in part by the demands of consumers and the marketing plans of the managers, but, to some degree, the bakers determine what baked goods to have on the store shelves. As one baker remarked:

Yeah, well (we) put out what is necessary. It makes sense, like I said, if we've got enough bread of the Alpine to get us until 2 or 3 o'clock, there's no sense in making that at nine if we need Canadian grain. The second guy coming in during the day, his days will change, his days are never the same, because I finish off what (the early baker) leaves me. Okay, now what do I need. Maybe today I need cookies, tomorrow I need cake, the next day I need banana rolls. Or the next day I need muffin mixes. Whatever I'm out of on the floor, I mean basically it's a fire sale. You put out what fires you can and leave the rest for tomorrow. You have to be flexible. Something goes on sale, you can't you run on a rigid shift, I don't feel. If you're out something and it's a sale item, and you haven't made enough the first time. All of a sudden, the 60 loaves that you made that you figured was going to get you through, somebody's looking for it at one o'clock in the afternoon, then you have to be flexible enough to make some more if you want to make your sales. The key is too understand how the changing demands are going to affect your day, and you have to make smart decisions about when to make what.

This account was reiterated by a fellow baker who also indicated that “(the bakery manager) leaves it up to us really...he knows that if we have orders that we'll prioritize

those and try to get those done first.” The bakery manager corroborated the perspective of the bakers and the role they play in determining the daily production:

I like to see most of the staff work out their own routines. Our bakers are very experienced and they know what needs to get done. It’s rare that I have to make any changes to what they are doing. Once in a while I’ll have to step in and say “Okay, this isn’t working as good as it should.” I know after working as a baker for a number of years, what the expectations should be to get a certain amount of product done by a certain amount of time. And then I work with the guys here as much as I can too. So if I see where there’s a routine that probably isn’t as good as it should be, or something we should be doing different, I try to step in and suggest something differently. I want to hear the guys’ opinions too and see what they think – what they think on the issue as well. There may be a good, logical explanation for some of the things that I think maybe could be done better. It’s something you gotta talk about with them.

Despite certain flexibility and autonomy with respect to the organization of their work flow, the recipes that FCL provides to the bakeries also put important limits product decisions. There are two recipe books in the Co-op bakery. The first is a small book found on the baker’s worktable. It is there for quick reference about core bakery recipes. The other recipe book is a large black binder containing hundreds of recipes, many of which are not used. The use of these recipes is another limiting factor for bakers and a means for management to exert control over the workplace. Deviation from the recipes in the book is seldom permitted. On any given day in the bakery, the bakers will bake 20 to 25 racks of baked goods. The demands of consumers, and the need to maintain efficiency in the bakery, necessitate that the racks be full and the baking schedule suitable. The baking process is made even more complex when the preceding stages of the process are considered, such as how long bread has to rise in the proofer, the time it takes to form all of the products from the dough, and even how long it takes to mix the dough.

On most days in the bakery, the bakers begin with the 100% whole wheat bread. As a scratch recipe, it is more time-consuming to mix, and it is best not to have that mixing conflict with the production of larger mixes such as the 60% whole wheat bread, white bread, and sweet dough. However, some mornings I would arrive at the bakery around 5:00am to find the bakers working on other breads. On one occasion they decided to start with the 60% whole wheat because the previous day's sales were so brisk. Referring back to the need to maximize the amount of bread on each baking rack, one morning the baker decided to make the rye bread first. Typically the rye breads are produced at the end of the baking day (meaning it would be baked by noon), but because there was open rack space he opted to make rye bread early.

Decisions about such things as the sequencing of breads and other baked items are left to the bakers. On many occasions the bakery manager, the bulk of whose duties were inventory, budgeting, scheduling, and dealing with personnel issues, would need to assist in the baking process. During my observation period the occurrences of the manager becoming directly involved in baking were more frequent due to a staffing problem. When the manager came to assist in the baking process, he would defer many questions about what to make or do next to the regular bakers, who are technically his subordinates. When asked why he did so, he remarked that the bakers know what needs to get done better than he does. This is a direct result of the autonomy the bakers have in arranging their work day. In this respect, the work occurring in the bakery has shown some level of skill retention, especially when compared to the workers at the industrial bakeries.

It appears that the workers at the industrial facilities have absolutely no input into what is produced and when. A production manager coordinates the product decisions and

the logistics of production. The products are developed by individuals who are not on site. At industrial facility A, the production manager is involved in the development of the breads but that development does not happen on site. A team of highly skilled technicians with food science backgrounds works independently on product development. The work done by these individuals is conducted in a manner similar to that described in the literature involving experiments with extenders and conditioners. According to the production manager at facility A, the work environment where the products are developed is most aptly described as a hybrid of a kitchen and a scientific laboratory. On occasion, this team will meet with the equally skilled production managers to assess the new developments, and strategize about which products to bring to market.

The situation at facility B is similar. A production coordinator, who is a graduate of a Masters of Science program in food science, oversees the production process. This individual is not actually involved in the development process but is on site to ensure that the 'recipe' being used is producing the desired end product. The production coordinator has the authority to alter the recipe at her discretion, but only in the case that the end product is not as originally desired. The structure of these work environments represents a model that is heavily coordinated at the top, where most of the decision-making prerogative lies with experts and with upper management. The production of the bread is highly mechanized and relies upon an unskilled, and easily replaced, labour force.

As indicated earlier, there is still a relatively high level of autonomy in the Co-op bakery, but changes are happening that severely threaten that independence and the skills of the bakers. While the bakers have some authority to determine what to bake (and in what order), those decisions are limited by FCL. The bakery manager at FCL makes the

vast majority of the decisions with respect to the product line offered at the Saskatoon Co-ops. This also pertains to the use of new technologies and the increased use of bread bases, already mentioned as a key agent of deskilling, and the increased use of frozen products. The introduction of frozen products has likewise impacted the skill set of the Co-op bakers, and has given the bakers a different outlook on the future of their occupation. On separate occasions, each of the bakers in this facility proclaimed that baking is a dying trade. It is not difficult to understand why frozen products have been central to this perception.

A mere six years prior to this study, most of the Co-op bakers were still preparing pastries from scratch. As the bakery manager indicated:

In the old days, we used to make our own puff pastry; we used to make our own pies and tart shells and all that stuff. We'd make our own croissants. All that stuff's time-consuming and [it] makes more sense to buy it these days from an outside supplier. And just proof and serve it or thaw and serve it.

The once time-consuming process is now quick and efficient. The longer it takes to make a product, the less profitable it is going to be. With cost effectiveness in mind—and product consistency across the chain also a concern—frozen pastries were introduced into the bakeries. According to one baker, whereas he used to enjoy making pastry and was very good at it, he doubts that he could do it as well as he used to. In his case, this appeared to be a humbling admission of skill erosion and degradation. The bakers themselves would have liked to continue making pastries but understood why they were being brought in frozen; in their own words they were “money savers.”

What is at issue here is that the bakers are generally not included in the decision making process with respect to the products they will make. Product decisions are

primarily the domain of the manager at FCL. Only on rare occasions have the bakers developed products that were adopted into the citywide network of Co-op grocery stores—let alone at the level of FCL.

Product decisions are only one way in which the autonomy of the bakers may be undermined. FCL also makes virtually all the choices with respect to bakery design. When they arrived at the newly constructed Co-op store, the bakers found the bakery already completed; they had no opportunity to provide input into the design. Only the bakery manager had the opportunity to give some feedback on the design, most of which was dismissed, including a minor request for a small change area with lockers for the bakers. With respect to the equipment being used, the well-being of the bakers is not necessarily a priority. In making the dough, the batches being mixed often weigh 200 pounds upon completion. The dough has to be removed from the mixing bowl in as few lifts as possible in order to maximize efficiency. However, the design of the mixer is such that the bakers removing the dough have no choice but to lift with their backs—as opposed to properly lifting with their legs. The process of lifting in excess of 1,000 pounds of dough a day, anywhere from five to seven days a week, takes a significant physical toll. This strain could be avoided by installing a dough lifter at a seemingly modest cost of \$700. The repeated requests of the bakers have gone unheeded. Even an upgrade to a digital scale, from the antiquated (and broken) balance, is denied. With respect to both product and bakery design decisions the workers are marginalized and experience a loss of an important dimension of skill.

A clear indicator of the ongoing process of deskilling in the co-operative network is in the design of the new Calgary co-operative grocery stores. In those stores the in-

store bakeries are being eliminated. Consumers looking for a fresh loaf of bread have to bake for themselves or go elsewhere in search of an alternative local or commercial bakery. Within the Saskatoon Co-op system, bakery workers exhibit some autonomy in the organization of their workday but have no control and little say regarding key decisions. The manager for FCL acknowledges that major changes are being implemented in terms of how co-op grocery stores produce their bread:

Since I've been around it is much more automated in the bakeries that still are scratch. There is more automation as far as the processing of the doughs after they're mixed. Less hand cutting, less hand rolling, those kinds of things. Also, just the scratch bakery itself is becoming an extinct part of what we do. Par-baked products, thaw and sell precuts, pre-proofed products, there's all kinds of technologies out there that you don't have to make or form dough anymore... We are predominantly bake-off now. In our system we have 139 bakeries and bake-offs. About 40 of them are scratch/mix type bakeries, and the rest are bake-offs. And that is kind of inverted from what it was when I started this job. When I started as the bakery director here we were predominantly scratch and less bake-offs and now that is turned right around.

Retaining skill levels in the bakery, and elsewhere in food production, is further complicated by the increased corporatization of the food system and the consolidation and integration of many firms involved in production. As large grocers increase their market share and solidify their brand identities, many of the bread companies are doing likewise. The need for a consistent products across large markets calls for standardized inputs, including flour.

The fourth research site in this investigation was a flour milling operation in Saskatoon, Saskatchewan. The mill ships its flours across North America but the flour is more than just milled wheat. The mill adds the extenders and conditioners, such as ascorbic acid, to the flour. These treatments, as they are labeled by the manager of the mill, a miller with 28 years of experience, are designed outside of the mill. The millers

follow the directives of the customers who work in tandem with specialists at other firms in the design of the mixes. In Saskatoon, the firm responsible for developing the mixes formerly also manufactured them. During time this thesis was being researched, the firm sold the manufacturing operations to the mill, relocated its research and development from Saskatoon to Michigan, and reconfigured its Saskatoon operation as a marketing office for Western Canada.

Restructuring and reorganization such as this may make communication difficult and solutions hard to attain when things do go wrong with inputs at the bakery. In the past, FCL and the Co-op bakers could call on the supplier when they needed to troubleshoot problems with the mixes; while they were outside of the development process at least they had access to the key knowledge workers. Under this new system, the miller becomes responsible for production but has no knowledge of the development process. The isolation of the miller from the design process results in further isolation from the process for the Co-op and, particularly, for its bakers. Historically, bakers and millers would collaborate in the development of bread flours and breads. Now bakers more closely resemble adjuncts to proprietary mixes and large-scale machinery in a heavily industrialized production chain. Their (dwindling) knowledge of bread making is seldom drawn upon in the development of new products. Knowledge is the capacity to understand the multiple dimensions that characterize any labour process—to grasp the variety of mechanisms that, as a chain, transform the labour process into a single coherent activity (Diaz & Stirling, 2003). In this environment the bakers experience increased levels of deskilling and erosion of their knowledge base.

5.3.3 SKILL AS SOCIAL STANDING

In Standing's (1992) definition of skill, social standing is a result of the interplay of skill as technique and the autonomy of the worker. The increased role of advanced technologies in the bread making process, especially large-scale, automated machinery and black box technologies such as bases and baking mixes, contribute to the degradation of the work process. Skill as technique in the making of bread has been, and continues to be, diminished in the Co-op bakeries; at the industrial bakeries it is rarely exhibited. The autonomy of the workers has also been diminished in both cases. Decisions at the Co-op bakery are less the domain of the bakers (and of their immediate supervisor) and are increasingly the prerogative of more senior managers who spend little time in the bakery. At times the manager at FCL will consult the bakers when deciding if a product is appropriate for the co-operative bakeries. For example, he will have the bakery managers test products in their bakeries and ask for their feedback on the product. For the most part, however, product decisions are made without the input of bakery managers so as not to "bog (the managers) down." It is responsibility the manager at FCL to investigate new products and to make decisions with respect to carrying or implementing those products in the co-operative system.

The role of the bakers in these product decisions is minimal. The bakers appear to accept the reality that their input is not important in the long-term planning of the bakery.

As one baker summarized:

I come up with an idea and I say my idea and if it flies it flies, if it doesn't that's about it. That's about the input I have, I have the idea. Really, when it comes to something, I can suggest it to the management and if the management doesn't like it there's nothing I can do. I'm not going to push an issue, it's not really worth my time.

On an occasion when a key piece of equipment had been purchased, the bakers had absolutely no input. The baker's account was that the machine was an absolute disaster. For the most part, the issue was that the machine would have been useful if only it had a larger capacity for dough. The hopper of the machine could only accommodate 25 pounds of dough at a time when the batch size was frequently 400 pounds of dough. The baker was frustrated by the need to constantly refill the machine. The action of going back and forth constituted a loss of valuable time that could have been applied better to other tasks. What needs to be taken from this account is that perhaps consultation with the bakers before implementation would have been appropriate to avoid problems that rendered the machine almost useless.

The lack of an invitation into the decision-making process is indicative of the declining status of the bakers in the Co-op system. The manager seemingly understands the impact that changes are having on the bakers. The deskilling process began even before his arrival, but has accelerated as a result of changes brought on by more numerous product options and more price-conscious competition in the marketplace. As the director recalls:

The move to mixes from scaling ingredients occurred before I came to Federated. That was probably in the late 70s, early 80s when that happened. Mixes and bases had been around but most people didn't use them because they weren't affordable. So, as everything evolved they became a bigger part of the business. And for guys like (name deleted) who's a baker, and has been baking since he was 18 years old at the Co-op in Saskatoon...for him, his whole world is baking, and that's threatening to him, right? Because, "Gosh, are you going to need me to bake a loaf of frozen white bread?" Well, we don't need your knowledge for you to open a case, right? We need your knowledge if we're doing what we're doing there now, but if that process changes there, who do you need, right? What kind of a qualification do you need? So, it's interesting.

This passage illustrates that the impact new technologies have on bakers is not lost on their managers. While an awareness of issues related to skills is evident, the Co-op still has to compete in a very price conscious market. These changes do not bode well for the bakers as they strive to preserve their craft. However, for the time being, they fair significantly better than their counterparts at the industrial bakeries.

The workers of the industrial bakeries have no input into product or production decisions. The failure to retain these aspects of skill in industrial bakery work environments, and also within flour mills, results in a decreased social standing for bakers and allied workers. The evidence for the deskilling of bakers is manifold and manifest.

5.4 DESKILLING: AN UNEVEN PROCESS

There is a further issue with respect to deskilling that does not coincide with Standing's three-part definition of skill. While skill as technique, autonomy in the workplace, and social standing are useful tools to use in aid of understanding the changes in skill levels for an occupation, it is also important to understand skill in terms of knowledge and training. The way in which an enterprise makes use of and reproduces knowledge can be useful indicators of how skill levels are changing.

Throughout the research process, it became evident that there is an imbalance between the skills that the Co-op consumes and the skills that it produces with respect to baking. The Co-op seeks out skilled bakers for its baking operations. All three bakers and the bakery manager at the research site had previous experience in baking before they

began their work with the Co-op. There is logic in this practice. As the bakery continues to make some product from scratch, it is in their interest to recruit people who are well versed in how to bake. As one baker stated:

They hire people with experience so that we pick up quick, and they just throw you in there. They basically gave me one week where I was working with other people, and basically after that I was working by myself. Like I said, they hire experienced people that should be able to figure it out. I mean, granted it is nice to see these people already know how to work these mixes. It's nice to watch them to figure it out, learn from them. But sometimes, the first time I made banana rolls here, no one showed me. I just saw that this is supposed to be a roll and it's turned out every time.

In this instance, without an experienced baker on staff it may have been difficult to get the product onto the shelves. The Co-op bakery relies on skilled bakers but does little to ensure that they produce a new generation of skilled bakers, at least where credentials are concerned. There is a process of continuous learning in the Co-op bakery, but it is informal and more specifically related to dealing with the nuances of baking rather than the systematic advancement of baking knowledge. The bakery manager discusses this in the following passage:

It's, the more you do something, the better you get at it, more or less. The shop conditions will change somewhat. You'll get different hardness of water at one place, you'll get different humidity at another place and so the way you do your doughs and stuff at one place might vary from the way you do them in another. So you'd always be learning there if you're always jumping around. All of our bakers had bakery experience before they came here. I'm sure (the part-time baker) applied a lot of that when he started, but I mean, he's come a long ways since coming here. It's just something you learn as you go down the road. And working with the guys who have the experience helps too.

The full-time baker also reflects upon the lack of bakery specific training:

Well basically, the training I got from my (first employer) is the training I got for here. They've never set squat for training. They send you to these courses on how to deal with people. But you learn from making mistakes,

doing it. You learn from the other guys that are here. That's one bad thing about bakery, it's the fact that no one wants to share their little secrets with you. "I learned it the hard way, by doing it, now you learn it." And that's what's happening to the trade. I mean, more and more of that is happening. And more and more these guys are retiring or dying, and all the old trade is pretty much gone to a large extent.

These stories illustrate two crucial issues. First, with respect to baking, the Co-op does very little to ensure that it trains a new generation of skilled bakers. At the same time they draw from a labour pool that has been trained outside the co-operative system. This creates a skills deficit, where at the end of a baker's tenure with the Co-op, the Co-op has not necessarily replaced those skills in a new generation of bakers. Second, the story provided by the full-time baker demonstrates that the training the bakers receive is typically more generic and relates mostly to customer relations.³⁰ In this respect the training implemented by the Co-op is not about unskilling the bakers, rather it applies more directly to ensuring that the store provides its members/customers with a pleasant shopping experience.

The Co-op does not offer bakery-specific training to the bakers, but if the bakers do choose to advance their training they do have options. First, those individuals who wish to advance their baking skills and knowledge can opt to pursue their journeyman's papers outside of the province. In the event that a baker chooses to do this, the Co-op will assist them in that pursuit. But this represents a passive approach to training; the Co-op relies on the initiative of the bakers rather than proactively encouraging the bakers to further their education as it pertains to baking. In contrast to bakery training, those bakers who wish to pursue management opportunities within the co-operative system have much

³⁰ Informal conversations with the manager of the Co-op grocery store revealed that the training courses the full-time baker referred to are for all Co-op grocery store employees regardless of their position or department.

better prospects. The Co-op provides training programs for individuals in many aspects of management, including a program specific to the management of a Co-op bakery. However, this form of educational commitment on the part of the Co-op does not (re)produce skilled bakers.

When we look at the knowledge and skills and training within the Co-op bakery we can identify two patterns with respect to deskilling. First, skill deficits are created when an enterprise makes a conscious effort to staff their work environments with well trained and experienced individuals, while simultaneously doing very little to train or upgrade the skills of its workers. In the case of the Co-op, all of their bakers learned their trade under the tutelage of experienced bakers before coming to the Co-op. As a group of bakers, however, they have little to teach each other with respect to baking. Most of what the bakers teach each other pertains to timesaving measures in their daily routines. Second, and related to the first point, there is a lifecycle to deskilling. When the full-time baker refers to baking as a dying trade due to attrition, he is cognizant of the fact that as a baker he knows less than those who trained him. This loss of knowledge is exacerbated by the advent of new bakery technologies, in particular mixes and bases. As the full-time baker now approaches his retirement, he has less knowledge to pass on compared to the generation before him. One can only imagine what the state of baking might be like when the younger bakers in the Co-op decide to leave the trade. Bakers as we now understand the occupation may practically cease to exist outside a few high-end, specialty bakeries and restaurants, a thought that leads us to the discussion of bakery work in the context of the Essential Skills program.

5.5 ESSENTIAL SKILLS AND BAKERY WORK

The Essential Skills (ES) program was developed under the guise of being a tool to adequately prepare Canadian workers for the emergent knowledge-based economy. In some ways the focus on a so-called knowledge economy is precisely the problem when investigating the skills of bakers and other workers in the food sector. Many occupations in the food sector appear to be significantly undervalued in the profiles of the ES database. As noted earlier, bakers are conspicuously absent from the occupation database. Instead, they fall under the category of Process Control and Machine Operators: Food and Beverage Processing. This section provides a more in-depth analysis of this category of worker. Further, the profile for these workers will be compared to the skills exhibited by the bakers studied at the Co-op bakery, as well as the workers observed in the industrial baking facilities. Beyond the analysis of workers and labour processes, the ES program itself is further examined. This analysis focuses on how the ES program incorporates many of the assumptions and characteristics of earlier approaches based on Taylor's pioneering work in scientific management.

The Essential Skills profile for Process Control and Machine Operators: Food and Beverage Processing, describes responsibilities of these workers as the operation of multi-function process control machinery or single-function machines to process and package food and beverage products. This definition effectively classifies and defines these workers as adjuncts to machinery in the preparation of food products. The workers themselves are not described as making food products; they are responsible for ensuring that the machines and technologies deployed in the processing and packing of these products function properly and effectively. The ES website asserts that the three most

important skills for these workers are numeracy, oral communication and problem solving. With respect to numeracy, most of the examples provided in the profile are at the lowest level of complexity and for the most part involve the measurement of inputs and the products produced. Amongst the numeracy skills needed, the profile notes that determining the production over an eight-hour shift is the most complex calculation. According to the ES profile, these tasks represent the most intimate involvement with the actual food products for Process Control and Machine Operators.

The other requisite skills identified by ES, which include oral communication and problem solving, reflect a deep reliance on machine technology in the production and processing of food. Examples of oral communication skills, at most a two out of five in complexity, most frequently involve the discussion of equipment requirements and notifying managers of equipment failures. Similarly, problem-solving skills are associated with trouble-shooting equipment-related problems. The most complex example of problem solving (complexity level of three) provided in the profile includes calling maintenance when an automated production process experiences a total shutdown, and perhaps taking intermediary steps while waiting for a maintenance worker to arrive. Interestingly, the most simple problem solving example (complexity level one) included how a worker might have to adjust a roller to alleviate wrinkled crust on a loaf (or loaves) of bread. In this example, we see how actual fine-tuning and troubleshooting of production-related operations as they affect the food product is undervalued.

This example is also interesting when one considers that the workers in the industrial facilities are unlikely to solve any problems related to the appearance of the crust. In both the facilities observed, the individuals that would actually see the end

product are far removed from the stations where the rollers (sheeters) are, and furthermore are not trained to deal with such problems. Even on the production line, such problems might go overlooked. In industrial facility B, there are no workers on the production line monitoring the finished breads. In industrial facility A, the workers were employed primarily to monitor the machines, not the bread. This example tends to validate the ES profile for Process Control and Machine Operators. However, the applicability of the profile does not mean that the workers at these types of facility find meaning or satisfaction in their work. Moreover, employee concern for the end product may be minimal. This perspective is reflected in a remark made by a worker in one of the industrial facilities that I visited. When he learned that I was studying the labour process in baking he commented: “you mean slave labour.”

The remaining six Essential Skills covered in this profile also focus on technological aspects of work. There is significant discussion of the importance of working with machinery and dealing with technological processes. There is virtually no discussion with respect to having any food knowledge or experience in food preparation. Further, while there is mention of the need to have some understanding of the technological processes and some capacity to solve mechanical problems, the profile often cites the need to communicate problems with maintenance workers who will solve the problem. The profile for Process Control and Machine Operators not only reflects the work typical of the industrial facilities I observed, but also the apparent detachment of the workers from the breads they produce. The work offered to these individuals is simple and less than engaging—their positions are low-skill occupations. Compared to the work of Co-op bakers, their work in making bread is quite fully deskilled. Skills are not the

only concern here though. It is also significant that these workers are presumed not to need any bread or food knowledge in order to make bread. The job application at industrial facility A never asks the applicants to disclose whether they have any experience working with food or certifications related to food handling. This represents one instance where the work and training in the industrial bakeries is dramatically different from that of the Co-op bakery.

Within the Co-op bakery, the importance of the three core Essential Skills from the Process Control and Machine Operator profile is quite evident. With respect to numeracy, the bakers display the ability to make complex calculations related to many different tasks and phases of the work. For example, to determine the amount of dough to mix given the production volume needed involves multiplication as well as knowledge about how much dough translates into a certain quantity of bread. Using the balance scale requires quick addition and subtraction, calculations made more complex by the need to calculate in ounces and pounds, which is quite a bit more sophisticated than the base ten calculations of the metric system. Oral communication between the bakers and the production assistants is crucial in the bakery. The bakers constantly check with each other about the products required from a batch of dough, what needs to be made next, what should be proofed or baked, and what should be baked off or retained for the next day. The production assistants frequently ask questions about when products will be ready.

In addition, the bakers demonstrate excellent problem solving abilities, which include repairing broken machines and equipment, troubleshooting bad mixes from suppliers, making minor adjustments to machinery, determining the optimal way to utilize their time to get product ready for the store, and coping with interpersonal

problems that arise from working in an intensive and crowded workplace. The latter also points to the importance of working well with others, another Essential Skill. There is a deep camaraderie in the bakery, and the ability to get along is essential for accomplishing the necessary tasks. Although as much as half of each shift for the baker is spent baking alone, the ability to understand the strengths and weaknesses of the person they are working with on a given day can result in a much smoother operation. One baker spoke about how he made sure to play to the strengths of his coworkers because “at the end of the day it saves everyone time and energy, it makes life easier for all of us.”

The requirements for other Essential Skills such as document use, computer use, reading text, and writing are less complex, although document use and reading text are important when the bakers need to consult recipes. Continuous learning as an Essential Skill is not formally acknowledged with respect to baking. Within the Co-op grocery store all employees, the bakers included, receive training with regard to customer service. Only the bakery manager has any actual baking certifications. This is not to say that continuous learning does not play a role in becoming a better baker. Throughout the observation period and during the interviews, all of the bakers noted that there is no substitute for experience when baking. Doing the job well involves gaining experience in working the dough. By physically interacting with dough, the bakers develop a deep tacit knowledge of their work. Over time they develop sensory knowledge about when dough is mixed or a bread/product is ready. One baker could assess the readiness of the dough by the sound it would make in the mixer, all of them could touch the dough and intuitively add flour or water to generate the desired consistency, and baking times would be adjusted based on how products in the oven responded to their touch.

This is precisely the type of knowledge and continuous learning that are neglected by ES. ES profiling does not appear to allow for the recognition of embodied, practical and tacit knowledge. The ES program associates continuous learning with certified training and updated credentials. The bakers at the Co-op have developed a highly specialized and not easily replicated set of skills and knowledge through non-certifiable routes. Such skills are significantly undervalued compared to other forms of learning within the ES program and in the workplace. Further, while many employers in the food industry may recognize this experience, the knowledge about bread possessed by experienced bakers does not necessarily make them any more employable in the food industry than their counterparts in the industrial facility.

This problem is exacerbated by the continued introduction of frozen products and industrial mixes into the bakeries. While bakers, such as those in the Co-op, have a wealth of knowledge to share with millers and production managers at large scale facilities, they are marginalized because of their lack of credentials. Despite obvious skill and knowledge disparities, the bakers would in all likelihood find themselves classed with the line workers at the industrial bakeries, who are quite accurately described as process control and machine operators. The lumping of bakers into the category of Process Control and Machine Operators is inaccurate and unjust. It may also be a sign of disrespect towards their skills, and a failure on the part of HRSDC to recognize specialized craft production. It would seem to suggest a bias in favour of capitalist and managerial attitudes toward labour.

5.6 SUMMARY OF FINDINGS

The different types of baking operations documented in this study make for interesting observations about the interplay of technologies and skill. As one might suspect, the larger-scale, automated technologies deployed at major industrial facilities have led to a situation where workers have little involvement in the actual bread-making process. In contrast, the bakers at the Co-op in-store bakery still retain many of the skills one might expect from a traditional baker. The mechanical aids and equipment they use are still at a scale which has minimal negative impact on their skills and knowledge. The introduction of formulated mixes and bases is, however, an important source of deskilling in the bakery. These products simplify the production process and create a situation where the bakers have to draw on their knowledge of bread-making less frequently. Moreover, both the Co-op bakers and the workers at the industrial facilities face deskilling in terms of the erosion of their workplace autonomy. At all of the bakeries studied workers have very little input with respect to the technologies that are adopted, product selection, or the recipes/ingredients to be used.

The circumstances described above also point toward the (uneven) deskilling of food workers. This process of deskilling is a result of not only technological change but also the social relations of production. The decision to implement technological changes lies with the managers of these facilities, whose primary concerns are efficiency and profitability. There appears to be little concern if the skill sets of traditional bakers are lost. However, the bakers at the Co-op were aware that they were still deploying skills that they had learned over time on the job. They speculated that it was unlikely that a new cohort of skilled workers would be found to replace their own. While the managers of the

Co-op prefer to hire skilled bakers, they do very little to ensure that the traditional skill sets of bakers is preserved and reproduced. The managers appear not to understand something the bakers seemingly know—that many unacknowledged skills are necessary to the smooth and efficient operation of the bakery.

6.0 DISCUSSION

6.1 OVERVIEW

In chapter five, I presented descriptions of the work environments that were studied, along with evidence for various forms and levels of deskilling. The Essential Skills program was problematized as a classification scheme that limits workers, and which develops categories of workers that perpetuate and even deepen class divisions. This chapter expands on these observations in several ways. First, I will briefly discuss the importance of Standing's (1992) definition of skill as a means to address deskilling, particularly how the use of a more comprehensive definition of skill can revitalize investigations of deskilling. However, the findings of this research project also point to some limitations in Standing's definition, especially as Canada moves towards a knowledge-based economy. Further reflections on Standing's work here includes a discussion of autonomy versus control, and the interconnectedness of skills and knowledge. The findings of this thesis demonstrate that the baking industry exhibits characteristics of a post-Fordist structure, which is resulting in the emergence of fewer highly skilled technical workers even as bakers and others on the production line face significant deskilling. Following from the discussion of autonomy and control, I discuss how technologies are not necessarily the most significant agents of deskilling; rather it is a combination of certain technologies and the social relations of production that continue to play the greatest role in deskilling.

Within this section I also revisit some of the literature on technology presented earlier. I conclude by commenting on the potential offered by alternatives with respect to the social organizations and relationships of production. In the summary section, I review

the findings of the thesis and also present a brief discussion of the effects the transformation of bread production (and food production more generally) can have on our culture.

6.2 INVESTIGATING DESKILLING: THE INTERPLAY OF STANDING AND BRAVERMAN

Standing's (1992) three-part definition of skill allows us to better understand deskilling. This more nuanced definition allows us to understand the process that Braverman first identified and to address the criticisms put forth by others since the appearance of *Labour and Monopoly Capital*. The central criticism of Braverman's work is that he downplayed the subjectivity of the worker, and portrayed them as passive and willing to accept change without objection (Krahn & Lowe, 2002, Smith & Thompson, 1998, Smith, 1994). Standing's inclusion of the relationship between autonomy and skill creates a framework where individuals investigating skills and deskilling can focus on the resistance and accommodation of workers as the subject. By including social standing as a part of skill, Standing (1992) forces the researcher to understand the social relationships inherent in all workplaces.

While the critiques of Braverman's work have been correct in pointing out that he failed to recognize the resistive capacities of workers, the findings from this study indicate that the capacity of workers to affect change and play a role in decision making are, in most circumstances, extremely limited. Neither the Co-op bakery manager nor the workers had any input into the design of the workplace. The managers of FCL make decisions with regards to product choices: it was their decisions that saw the introduction of mixes and frozen products to the bakery. Even when relatively inexpensive

technologies are requested by bakers to assist in their daily work, managers frequently reject their input. The most obvious example of this is the repeated refusals by FCL managers toward the bakers' requests for a dough lifter. This would save not just their backs but also production time. What we see in the Co-op bakery is a production process, almost fully co-ordinated by upper levels of management. Where the bakers are looking for technologies that will complement their skill and knowledge base, the management at FCL is looking for technologies that reconstitute the bread-making process as one controlled by management. These changes are particularly evident in FCL's management of their Calgary retail outlets, where in-store bakeries have been totally eliminated and the bread making outsourced to larger industrial bakeries. It is this type of relationship that is the hallmark of Braverman's deskilling thesis.

This finding necessarily relates back to Standing's definition of skill. While his three-part definition fosters a more adequate and comprehensive understanding of what skill entails, we can be confused by the language he uses. When we look at skill as autonomy there may be a tendency to over-represent the role of worker in the decision making process. Autonomy is associated with having independence in the workplace, the ability to guide one's own work on a day-to-day basis. This type of autonomy is present in the bakery at the Co-op. Every day the bakers decide how much of each product to make, and what is the optimal way to make the necessary product. However, the managers at FCL make product and recipe decisions. The bakers have also internalized the expectations of management regarding what to do. An occupation in which the bulk of control and decision-making authority rests with managers removed from the workplace is subject to the threat of skill erosion. When we look at deskilling, what

should also be at issue is control of the work process and the knowledge one needs to assert such control. Where autonomy refers to independence, control should confer an aura of authority and command over one's own work. Skill should also be measured with respect to the role that workers have in key decisions. This can be problematic when one considers that control is argued by some as the capacity to define how things are produced—a capacity that emerges from economic ownership (Diaz & Stirling, 2003).

Within the Co-op bakery, this would have meant that the bakers participate fully in decisions concerning equipment, the layout of the facility, and, most importantly, which products would be introduced and whether or not mixes are a necessary technology in the workplace. Academics argue that the involvement of workers in the decision process creates a whole new atmosphere with respect to technological implementation. As Rothschild argues, “those who make decisions about the introduction and implementation of new technology in the workplace will tend to choose technologies that expand their own discretion, autonomy, and enjoyment in the work process” (2000: 206). However, while workers would obviously select technologies that expand their autonomy, they frequently lack control over the decisions and decision-making process.

The workers in the industrial bakeries appear to have virtually no say over the conditions of their work. These workers more closely resemble the profile for Process Control and Machine Operators: Food and Beverage Industry; that is, they work as adjuncts to the machinery. The technology is in place as the core means of production. The baking process in these facilities has been reconstituted as a fully mechanized and mostly automated process. The workers in these facilities are almost an afterthought.

They are trained to be complements to the machinery that surrounds them, whether it produces bread, canned soups, or beverages.

Lack of control over the design, and continued redesign, of the work process is one hallmark of the deskilling process in the baking industry. The introduction of technologies contributes to the deskilling of food workers. At the industrial bakery, it is the scope of the machinery and automation that deepens the deskilling. At the Co-op bakery, it is the introduction of mixes and frozen products that most significantly contributes to the deskilling process.

The introduction of mixes and frozen products not only demands less of the bakers with respect to their skills as technique, it constitutes an intangible type of deskilling. Not only are the bakers required to perform fewer manual tasks, but the introduction of mixes and bases (black box technologies) erodes the knowledge they need to have of the baking process. When Braverman (1974) details the reconstruction of the work process as a procedure controlled by management, we have to understand skill as something more than technique. Being able to accomplish something, such as making bread, not only requires the physical skills to do so, but also an understanding of what is happening. The development of any product not only requires a how, but also a why. The why of the work process is a crucial part of the knowledge. When management opts to mechanize a production process and lower the skill level of workers, they are also attacking the knowledge base of the workers. The knowledge may still exist, but a select few individuals own it. Others who have diminishing or zero knowledge of the details or design complete the work process.

This is the case at both of the industrial facilities. In both instances the development of the breads is conducted in facilities that one manager described as a hybrid of a traditional kitchen and a scientific laboratory. These individuals develop the recipes for the benefit of large corporations, who then disseminate the recipes to facilities across Canada, North America, and the world, so that their brand of bread is the same no matter where it is purchased. The evidence, with respect to the structure of work, points to post-Fordist conceptions of the work place, where one group of workers will see their skill base eroded even as others are required to develop more advanced skills. Bread making is no exception in this regard. The production manager at industrial facility A best exemplified this. This individual was a certified miller and had graduated with a degree in food science. She had a wealth of knowledge about bread, the different approaches to making bread, and a deep understanding of the technological advances that have accompanied the industrialization of bread production. However, the development of products for the company she worked for involved only 10 individuals in Canada. When we compare this group of 10 highly skilled and knowledgeable workers to the multiple bakers that have seen their occupation deskilled, there should be a concern about the aggregate level of deskilling in the food industry. Of particular concern is that the bread making process falls under the ownership of a select group of people, to whom the general populace does not have access.

6.3 ESSENTIAL SKILLS: SCIENTIFIC MANAGEMENT REVISITED

The Canadian government promotes Canada as a country with a knowledge-based economy. The benefits of this approach can include promotion of workplaces that

provide complex, highly skilled employment, such as the position of production manager at the industrial baking facilities that were part of this study. Understanding of the potential consequences of such a hierarchical workplace appears, however, to be limited. The government seems to ignore the possibility that such changes can negatively affect other groups of workers.

The ES program put forth by HRSDC in some ways harkens back to the development of normalized tools (Therblig charts) for analyzing work. In the same fashion that managers and engineers would carefully study how workers executed their tasks, so too the accredited ES profilers observe the day-to-day activities of the worker. Just as the Therblig Charts used categories of specific actions, the ES profiles are divided into the nine Essential Skills. However, rather than time being the primary unit of measure for the ES profiler, the perceived level of complexity of component tasks is the basis of characterization and categorization of the work. The shift from time to complexity as the unit of measure is necessitated by the over-arching goals of policy-makers who view Canada as a knowledge-based economy. Over 200 occupations have been catalogued to date, including professional occupations. Given the breadth of the profiles as well as the differences among occupations, it makes little sense to use time as a unit of analysis. Moreover, the focus on the general nature of particular jobs rather than on the specifics of their execution also makes it more difficult to use time as a unit of analysis.³¹ Instead, complexity becomes the unit of measure for ES.

³¹ It should be noted that despite the shift to complexity as a unit of measure, time is still an important factor in the execution of work. While changes in the baking industry demonstrate a shift toward less complex work in the bread-making process, many of these changes occur as a result of the desire to reduce the time required to produce bread. Principles of timesaving and efficiency continue to be central concerns with respect to the organization of work.

Measuring and classifying work in terms of complexity effectively creates classes of workers. Occupations that call for skills that are judged to be low-level in terms of complexity are cheapened (in more than one sense of the word). The profiles can be used as tools for managers who seek to develop and/or reinforce workplace hierarchies. Further, ‘concrete’ knowledge of the skills and skill complexity for a given occupation can allow employers to better screen their (potential) employees. To utilize the profiles in a screening process further marginalizes individuals who may lack qualifications but are very capable of quickly learning the skills required to effectively do the job. In this way, the ES program can actually contribute to deskilling, especially if we consider the social status aspect of skill. By creating categories of less-skilled occupations we denigrate and condemn the workers who perform those tasks.

6.4 TECHNOLOGY AND AGENCY

In chapter two, a considerable discussion was presented with respect to the ideas of technological determinism, the social construction of technologies, and the interplay between human subjects and material technologies. Perspectives on the relationships between people and technology are almost as numerous as technologies themselves but it is nonetheless important to revisit these perspectives, particularly in light of the research findings. The technologies in place in different work environments have varying effects on workers but, overall, technologies in the baking industry are deskilling workers. In the Co-op bakery, the machine technologies serve mainly to increase the productive capacity of the small number of workers. However, the technologies embedded in the mixes and bases used by the bakers erode their knowledge. While the continued introduction of

these technologies is not necessarily in the interest of the bakers, it is also outside their decision-making realm. They have no control over the process of technological adoption. The automated technologies in the industrial baking facilities serve to minimize the interactions of workers with the bread making process. Their occupations present little opportunity for advancement, and do not offer the chance to gain any specialized knowledge about bread making.

Both equipment and black-box technologies play a role in the deskilling process, and the introduction of new technology frequently leads to further technological innovation. For example, industrial facility A is much older than facility B, and the differences are obvious. The introduction of the Mecatherm in facility B serves to remove even more individuals from the actual bread making process. The machine turns making bread into a completely self-contained process. In facility A, workers were stationed along the line to monitor the progress of the bread before and after proofing, but in facility B as soon as the mix was delivered to the hopper there were no employees on the line until the bread was packaged. The original concept of an automated bread line continues to evolve, and as it does the process requires fewer workers. Also, with the introduction of the Mecatherm, and the flash frozen breads it produces, the need for relatively skilled workers at in-store bakeries decreases.

The cycle of technological change in the baking industry is a good illustration of the concept of material agency (Pickering, 1993). The technologies themselves affect the way we do things in the social world. In the case of the bread industry, the continued introduction of new technologies alters our concepts of making bread; a once manual process performed by skilled bakers is being reconstituted as a mechanized process.

Interestingly, the development of frozen products is being marketed as a means of reconnecting the consumer with bread-making as the consumer can buy frozen loaves to bake at home. But the choice of bringing home a partially frozen loaf does nothing to preserve our bread culture or reskill home bakers. Heating the bread for the final ten minutes does not translate into knowledge of bread making.

While the findings present evidence for material agency, it is important not to overemphasize the role of technologies in the deskilling process. Though it is true that the machines and technologies that are put in place result in deskilling of workers, and that machines and formulated inputs can alter both work practices and the social world, the technologies do not create and install themselves in the workplace (at least not yet). The decision to introduce a technology is a social one. In the case of the Co-op bakery, it is the decision makers at FCL who ultimately decide on the products offered and how and where they are made. The bakers did not choose to stop making pastries and other fancy products; FCL made the decision as a means of improving the efficiency, productivity and profitability of the bakery. Also striking in this regard is the decision of FCL not to include in-store bakeries when they developed their newer Calgary stores. A continued push towards fewer products prepared in-store, and toward simplified in-store production methods, will have drastic implications for the bakers working in Saskatoon Co-ops. They are likely to experience further deskilling. Human agency is more important in the deskilling process than any form of purely material agency. The decision to automate and to introduce technologies is a product of individuals whose commitment is not necessarily to workers but to efficiency and, more importantly, to labour productivity and profit.

Some may argue that technologies have agency in the push towards efficiency and profitability, as they become key actors in the market environment. As discussed earlier, Schilling argues that “where an entrenched dominant standard exists, or where an industry is in the process of selecting a dominant standard, firms may be at risk of being locked out of the market” if they do not conform to the industry standard (1998: 267). Thus, given that industrial facility B has introduced the Mecatherm, others may find it necessary to follow suit. The Mecatherm greatly increases the potential market for their breads. The freezing technology allows them to ship bread across North America, where others must rely on regional markets for their products. Industrial facility B might be able to market their frozen breads as a means of presenting ‘fresher’ bread to consumers. These changes are more commonplace in a radically changing food industry. Having a large productive capacity and the ability to ship over greater distances plays into the increasingly dominant paradigm of large national and regional grocery chains that demand large volumes of a uniform product. However, the decision to consolidate grocery stores, which forces bread suppliers to produce more volume with greater uniformity, is also not one based on material agency. The decision to consolidate in the retail grocery sector is the result of a drive towards increased market power, efficiencies, and profitability. These are decisions made by human actors based on capitalist objectives. We should understand that it is not the technology itself, but rather human decision-makers who are the most integral agents of deskilling.

6.5 THE SOCIAL RELATIONS OF PRODUCTION

Despite the evidence for deskilling in the Co-op bakery, it is important to discuss how the social organization has some benefit for the workers. While there is a failure to include the bakers in key decisions, the skills they bring to the workplace are not completely overlooked: the bakery tries to employ experienced bakers. The pay scale at the Co-op bakery (and the rest of the Co-op) can offer employees an enhanced standard of living when compared to those working for many competitor enterprises.³² The top of the pay scale for the bakers themselves nears twenty dollars per hour, and the bakers can also earn up to seven weeks of annual paid vacation time. Overtime work is consistently recognized and appropriately compensated. While it was not directly asked, the bakers indicated that the bakery manager fares even better with respect to remuneration. The Co-op itself has a very familial atmosphere, with many employees working for extended periods of time. This is encouraged by managers who believe that there should be viable career options in food retailing. Of the individuals interviewed at the Co-op, the tenure of the bakers ranged from four years (for the young part-time baker) to 28 years for the most experienced baker. The bakery manager had moved through the ranks of the Saskatchewan Co-operative Association and had over two decades of experience with co-operatives. The manager of the grocery store had started his co-operative career in high school working at a Co-op grocery store in British Columbia; over 25 years later he still exudes great pride in being a part of the Co-op. The manager from FCL had years of experience working with affiliated co-operatives in Saskatchewan, although his career was complemented with experiences outside of co-operatives. It should also be noted that

³² Employees working in the retail grocery outlets for the Saskatoon Co-op are members of a union. The role of the union in should not be underestimated in the benefits that employees receive.

many of these individuals had generational ties to co-operatives, with parents, siblings, or children working in the co-operative sector.

The stories of the youngest baker's experiences in other in-store bakeries provide an interesting counterpoint. Having had training in a small-scale retail bakery, the baker moved to Saskatoon to attend university and found employment at an in-store bakery for a national grocer. Within six months he had been promoted from part-time worker to bakery manager. He estimated that the average tenure for other employees in the bakery was approximately three months, with many workers leaving due to the nature of the work and the poor pay. Even as the bakery manager the baker made less per hour than he does as a part-time baker at the Co-op. Moreover, at the Co-op he receives a benefits package; benefits were non-existent through his previous employer. In addition to better wages and benefits, there were two reasons that he chose to leave for the Co-op. The first of these was the incompetence of his former superiors, and their reluctance to listen to him. On one occasion, the store manager, in an attempt to save money, insisted that they only needed to order the base and not the flour to make the bread. Despite the baker's pleas and arguments that doing so was not an option, the store manager neglected to order flour. When it became obvious that bread cannot be made without flour, the manager blamed the baker for not communicating the need better. Around the same time as this event, the manager, who had promised full-time hours to the baker as the bakery manager, reneged on this pledge. The lack of competence, compassion, trust, fairness, and respect led the baker to leave and pursue work elsewhere.

This contrast raises the potential impact different social relations of production can have on workers. The Co-op is very successful as a grocery retailer in Saskatoon and

despite the perceived price-consciousness of its customers and members, it is able to treat employees relatively well and still generate a surplus in a price-driven market. Such commitment to employees, and the reciprocal loyalty of the employees, is not that common in today's economy. However, there still needs to be concern over the technological and product choices being made and their effects on occupations such as baking. The centralization of decision-making outside of the store is distressing, in particular as this study points to the deskilling of bakery work. However, the commitment of the Co-op to its employees serves as a marketable advantage. Limiting turnover by treating employees with respect and offering them wages that permit them a reasonable living can create loyalty that is reflected in efficient, careful, and resourceful work habits. It is unfortunate that the employees are losing control over key aspects of their work.

This study raises interesting questions for future research into work, especially with respect to the social relations of production. The anecdotal stories of the young baker point towards the potential advantages of working in a co-operative. It would be interesting to investigate more fully the differences between the Co-op and other grocers with respect to employee satisfaction, retention, training, and skills. This investigation could be expanded to include other forms of co-operatives. How do different types of co-operatives (consumer, purchasing, worker-owned) perform as centres for skill and knowledge retention?

6.6 SUMMARY

The findings of this research point to the existence of deskilling in the baking industry as defined by Braverman (1974). By utilizing his core concepts and coupling

them with the more complex definition of skill put forward by Standing (1992), we can build a strong case in support of the deskilling thesis. Deskilling is clearly evident among employees working in the food industry; in this case the workers on the production line in industrial bakeries and the bakers at an in-store retail Co-op bakery. In understanding the findings it is crucial to recognize the machinery and technology as playing a significant role in the erosion of skills, however, and most importantly, it is the social relations influencing the production process that are the key agents of deskilling. When decisions about the production process (the equipment, the inputs, and the products offered) are separated from the workers that they affect, the most deskilling occurs. While workers might have considerable autonomy in the structure of their daily routines, the lack of control over macro-level decisions and issues is tantamount to deskilling.

Within the baking industry many workers are experiencing loss of skill as a result of not having power over key decisions. As this occurs there is, however, a select group of workers in the industry who deploy high levels of skill, reasonable control over the work process, and expert knowledge as they reinvent the bread-making process as scientific practice. Even with increasing skills at this level, aggregate skill levels in the baking industry decrease, and the knowledge of traditional bread production is being lost.

Knowledge becomes a key issue. With the advent of the ES, the Canadian Government continues to position Canada as a country hallmarked by a knowledge-based economy. Food production, however, is marginalized and there is little recognition for the complex skills and specialized knowledge that people more intimately involved with food demonstrate. This raises two crucial issues in light of the research. The first is whether people can have trust in the food they consume when it is produced in a heavily

industrialized setting. It merits mention that in my conversations with the production manager of industrial facility A and manger of the mill in Saskatoon that neither of them trusted their product enough to eat it. The production manager at the industrial bakery bought her bread from a local bakery where she could select from a more wholesome selection of bread. The manager of the mill chooses to purchase his bread from the local farmers market or a local bakery in his neighbourhood. The apparent skepticism of these individuals towards the system of food production they are key actors in should be troubling to all consumers. Second, returning to the discussion of skill, it is very important that we continue to recognize the interconnectedness of skill and knowledge. In a time where many perceive us to be entering a knowledge-based economy we need to appreciate that deskilling involves something more than reductions in skill as technique. Deskilling must also be viewed as a process of deknowledging. Reducing the knowledge that an individual requires to complete a given task serves to marginalize that individual. A lack of knowledge puts the worker in a vulnerable position where control is difficult to regain.

This study has its limitations. First, the study would certainly have benefited from the ability to interview the workers at the industrial baking facilities. In addition, longer observation periods at these facilities would have enhanced the findings. Also, in order to generate a broader understanding of the bread industry interviews and observation at small-scale bakeries would have helped to inform the study regarding the extent of deskilling in different work environments. However, the investigation into the supply chain affecting the Co-op bakery, and the industrial facilities does add important dimensions to the findings. One of the strengths of the research in this regard is that it

points to arenas for future research regarding skills and knowledge of workers. The pattern that emerged from the investigation is one where deskilling becomes more apparent as mechanization and automation increase within production facilities. Future studies of work with respect to skill and knowledge retention should focus on comparisons of the different sizes and forms of work organization such as industrial facilities, light industrial environments, small businesses, and traditional capitalist enterprises versus co-operative forms of ownership. To ensure rewarding work experiences we need to continue to investigate work and the labour process with a critical eye. The findings of this research illustrate that there is still life in Braverman's deskilling thesis, especially when considered alongside new research with respect to skills.

REFERENCES

- Azizi, M. & Rao, G. (2004) "Effect of Surfactant Gels on Dough Rheological Characteristics and Quality of Bread." *Critical Reviews in Food Science and Nutrition* 44: 545 – 552.
- Braverman, Harry. (1974) *Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York: Monthly Review Press.
- Burn, Doug. (1998) "Automation: the future of food production." *Food In Canada* 58 (4): 65 – 67.
- Burris, Beverly H. (1999) "Braverman, Taylorism, and Technocracy." *Rethinking the Labor Process*. Ed. Mark Wardell, Thomas L. Steiger & Peter Meiksins. Albany, NY: State University of New York Press. 37 – 52.
- Cauvain, Stanley P. & Young, Linda S. (2006) *The Chorleywood Bread Process*. Cambridge, UK: Woodhead Publishing Limited.
- Cohen, Shelia. (1987) "A Labour Process to Nowhere?" *New Left Review* 165 (September/October): 34 – 50.
- Coleman, William D. (2004) "Globalization and Co-operatives." *Co-operative Membership and Globalization: New Directions in Research and Practice* Ed. Brett Fairbairn & Nora Russell. Saskatoon, Canada: Houghton Boston. 3 – 17.
- Coriat, Benjamin. (1992) "The Revitalization of Mass Production in the Computer Age." *Pathways to Industrialization and Regional Development* Ed. Michael Storper & Allen J. Scott. New York, NY: Routledge. 137 - 156.
- Cotgrove, Stephen. (1970) "The Sociology of Science and Technology." *The British Journal of Sociology* 21 (1): 1- 15.
- Diaz, Harry P. & Stirling, Robert. (2003) "Degradation of Farm Work in the Canadian Prairies." *Farm Communities at the Crossroads: Challenge and Resistance* Ed. Harry P. Diaz, JoAnn Jaffe & Robert Stirling. Regina, Saskatchewan: Canadian Plains Research Center, University of Regina. 31 – 44.
- Eagle, Sandra. (2002) "Aces high: a passion for great bread is the driving force behind this Toronto bakery." *Food In Canada* 62 (1): 32 – 33.
- Form, William. (1987) "On the Degradation of Skills." *Annual Review of Sociology* 13: 29 – 47.
- Friedland, William. (2004) "Agrifood Globalization and Commodity Systems." *International Journal of Sociology of Agriculture and Food*: 5 – 16.

- Gareau, Stephen E. (2004) "The Development of Guidelines for Implementing Information Technology to Promote Food Security." *Agriculture Food and Human Values* 21: 273 – 285.
- Gouliquer, Lynn. (2000) "Pandora's Box: The Paradox of Flexibility in Today's Workplace." *Current Sociology* 48 (1): 29 – 38.
- Hachen, David. (1988) "The Delicate Balance: Technology and Control in Organizations." *The British Journal of Sociology* 39 (3): 337 – 357.
- Hage, Jerald & Powers, Charles H. (1992) *Post-Industrial Lives: Roles and Relationships in the 21st Century*. Newbury Park, CA: Sage.
- Hendrickson, Mary; Heffernan, William; Howard, Philip & Heffernan, Judith. (2001) "Consolidation in food retailing and dairy." *British Food Journal* 103 (10): 715 – 728.
- Higgins, Kieran. (2001) "Global food retailing." *British Food Journal* 103 (10): 749 – 754.
- Hughes, Karen D. & Lowe, Graham S. (2000) "Surveying the 'Post-Industrial' Landscape: Information Technologies and Labour Market Polarization in Canada." *The Canadian Review of Sociology and Anthropology* 37 (1): 29 – 53.
- Hutchby, Ian. (2001) "Technologies, Texts and Affordances." *Sociology* 35 (2): 441 – 456.
- Jaffe, JoAnn & Gertler, Michael. (2006) "Victual Vicissitudes: Consumer Deskillling and the (Gendered) Transformation of Food Systems" *Agriculture Food & Human Values* 23 (2): 143 – 162.
- Jessop, Bob. (1992) "Fordism and Post-Fordism: A Critical Reformulation." *Pathways to Industrialization and Regional Development* Ed. Michael Storper & Allen J. Scott. New York, NY: Routledge. 46 – 69.
- Kaufman, Phil. (2000) "Consolidation in Food Retailing: Prospects for Consumers & Grocery Suppliers." *Agricultural Outlook* August: 18 – 22.
- Kohane, Jack. (2003) "A new breed of breadwinner." *Food In Canada* 63 (1): 43 – 44.
- Krahn, Harvey J. & Lowe, Graham S. (2002) *Work, Industry and Canadian Society* 4th Edition Scarborough, ON: Thomson Nelson.
- Lawrence, Felicity. (2004) *Not on the Label*. London: Penguin Books.

Leborgne, Danièle & Lipietz, Alain. (1992) "Conceptual Fallacies and Open Questions of Post-Fordism." *Pathways to Industrialization and Regional Development* Ed. Michael Storper & Allen J. Scott. New York, NY: Routledge. 332 - 348.

Lind, David & Barham, Elizabeth. (2004) "The social life of the tortilla: Food, cultural politics, and contested commodification." *Agriculture and Human Values* 21: 47 – 60.

Love, Myron. (2004) "Retail grocers losing ground to the big boxes, drugstore-pollster." *Canadian Grocer* 118 (5): 17.

Lupien, John R. (2005) "Food Quality and Safety: Traceability and Labeling." *Critical Reviews in Food Science and Nutrition* 45: 119 – 123.

Mason, J. (2002) *Qualitative researching* 2nd Edition. London: SAGE Publications.

McCance, R. A. & Widdowson, E. M. (1956) *Breads White and Brown: Their Place in Thought and Social History* Montreal: J. B. Lippincott Company.

Novek, Joel. (1992) "The labour process and workplace injuries in the Canadian meat packing industry." *The Canadian Review of Sociology and Anthropology* 29 (1): 17 – 37.

Ozdemir, Murat & Floros, John D. (2004) "Active Food Packaging Technologies." *Critical Reviews in Food Science and Nutrition* 44: 185 – 193.

Penn, Roger. (1984) *Skilled Workers in the Class Structure* New York: Cambridge University Press.

Perkins, Ben. (2001) "The European retail grocery market overview." *British Food Journal* 103 (10): 744 – 748.

Pickering, Andrew. (1993) "The Mangle of Practice: Agency and Emergence in the Sociology of Science." *American Journal of Sociology* 99 (3): 559 – 589.

Postman, Neil. (1992) *Technopoly: The Surrender of Culture to Technology* New York: Alfred A. Knopf Inc.

Pszczola, Donald E. (2005) "Never Say Never: Emerging Technologies Solve Familiar Problems." *Food Technology* 59 (7): 12 – 14.

Rappert, Brian. (2003) "Technologies, Texts and Possibilities: A Reply to Hutchby." *Sociology* 37 (3): 565 – 580.

Ritzer, George. (2004) *The McDonaldization of Society* Thousand Oaks, CA: Pine Forge Press.

Rousseau, Denise. (1979) "Assessment of Technology in Organizations: Closed versus Open Systems Approaches." *Academy of Management Review* 4 (4): 531 – 542.

Schilling, Melissa. (1998) "Technological Lockout: An Integrative Model of the Economic and Strategic Factors Driving Technology Success and Failure." *The Academy of Management Review* 23 (2): 267 – 284.

Schofield, John. (2003) "The dope on dough." *Food In Canada* 63 (1): 38 – 41.

Sennett, Richard. (1998) *The Corrosion of Character: The Personal Consequences of Work in the New Capitalism* W.W. Norton & Company Inc. New York, NY.

Senorans, F. Javier, Ibanez, Elena & Cifuentes, Alejandro. (2003) "New Trends in Food Processing." *Critical Reviews in Food Science and Nutrition* 43 (5): 507 – 526.

Serrin, William. (1980) "Let Them Eat Junk." *Saturday Review* Feb 2: 23.

Shepard, Jon M. (1977) "Technology, Alienation, and job Satisfaction." *The Annual Review of Sociology* 3: 1 – 21.

Simpson, Richard L. (1985) "Social Control of Occupations and Work." *The Annual Review of Sociology* 11: 415 – 436.

Silverman, David. (2001) *interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction* Thousand Oaks, CA: SAGE Publications.

Sijtsema, Siet, Linnemann, Anita, van Gaasbeek, Ton, Dagevos, Hans & Jongen, Wim. (2002) "Variables Influencing Food Perception Reviewed for Consumer-Oriented Product Development." *Critical Reviews in Food Science and Nutrition* 42 (6): 565 – 581.

Smith, Vicki. (1994) "Braverman's Legacy: The Labor Process Tradition at 20." *Work and Occupations* 21 (4): 403 – 421.

Smith, James P., Daifas, Daphne, El-Khoury, Wassim, Koukoutsis, John & El_Khoury, Anis (2004) "Shelf Life and Safety Concerns of Bakery Products—A Review." *Critical Reviews in Food Science and Nutrition* 44: 19 – 55.

Smith, Chris & Thompson, Paul. (1999) "Reevaluating the Labour Process Debate." *Rethinking the Labor Process* Ed. Mark Wardell, Thomas L. Steiger & Peter Meiksins. Albany, NY: State University of New York Press. 205 – 232.

Standing, Guy. (1992) "Alternative Routes to Labor Flexibility." *Pathways to Industrialization and Regional Development* Ed. Michael Storper & Allen J. Scott. New York, NY: Routledge. 255 – 275.

- Steiger, Thomas L. (1999) "Forms of the Labor Process and Labor's Share of Value." *Rethinking the Labor Process* Ed. Mark Wardell, Thomas L. Steiger & Peter Meiksins. Albany, NY: State University of New York Press. 189 – 204.
- Turock, Art & Rogers, David. (2005) "Competing with Wal-Mart & Son of Wal-Mart (aka the Supercenter)." *Canadian Grocer* 119 (1): 50 – 55.
- Tutunjian, Jerry. (2005) "2004: A healthy year." *Canadian Grocer* 119 (1): 26 – 32.
- Udy, Stanley J., Jr. (1970) *Work in Traditional and Modern Society* Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- Van Donk, Dirk Pieter. (2000) "Customer-driven manufacturing in the food processing industry." *British Food Journal* 102 (10): 739 – 747.
- Wardell, Mark. (1999) "Labor Processes: Moving Beyond Braverman and the Deskillling Debate." *Rethinking the Labor Process* Ed. Mark Wardell, Thomas L. Steiger & Peter Meiksins. Albany, NY: State University of New York Press. 1 – 16.
- Wajcman, Judy. (2002) "Addressing Technological Change: The Challenge of Social Theory." *Current Sociology* 50 (3): 347 – 363.
- Wrigley, Neil. (2001) "The Consolidation Wave in U.S. Food Retailing: A European Perspective." *Agribusiness* 17 (4): 489 – 513.
- Yapp, Charlotte & Fairman, Robyn. (2006) "Factors affecting food safety compliance within small and medium-sized enterprises: implications for regulatory and enforcement strategies." *Food Control* 17: 42 – 51.